

Clemson University



3 1604 013 347 358



Digitized by the Internet Archive
in 2013



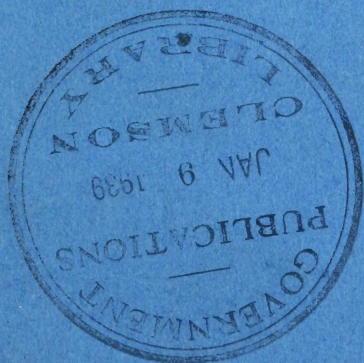
I 1.1:938 /

**ANNUAL REPORT
OF THE
SECRETARY
OF THE INTERIOR**



**FOR THE FISCAL YEAR ENDED
JUNE 30**

1938



ANNUAL REPORT
OF THE
SECRETARY
OF THE INTERIOR



FOR THE FISCAL YEAR ENDED JUNE 30

1938

UNITED STATES GOVERNMENT PRINTING OFFICE
WASHINGTON : 1938

UNITED STATES DEPARTMENT OF THE INTERIOR

Harold L. Ickes, Secretary

•

For sale by the
Superintendent of Documents, Washington, D. C.

Price 50 cents

CONTENTS

REPORT BY BUREAUS AND DIVISIONS

	Page
Letter of Transmittal	v
The National Park Service	1
Bureau of Reclamation	51
The Bonneville Project	84
General Land Office	87
Division of Grazing	107
Director of Forests	122
Geological Survey.	125
Bureau of Mines	173
Office of Indian Affairs	209
Office of the Solicitor	264
War Minerals Relief Commission	270
Division of Territories and Island Possessions	273
Puerto Rico Reconstruction Administration	281
Office of Education	294
Division of Investigations	357
Petroleum Conservation Division	360
Division of Information	366
Division of Motion Pictures	367
Office of Exhibits	368
Office of the Adviser on Negro Affairs	369
Board on Geographical Names	371
St. Elizabeths Hospital	373
Howard University	395
Freedmen's Hospital	415
Columbia Institution for the Deaf	417

ILLUSTRATIONS

Frontispiece, Olympic National Park, Washington.	facing page	v
Kings River, California, a proposed national park	facing page	1
Onions harvested on Owyhee reclamation project, Oregon	facing page	51
Lettuce grown on Salt River reclamation project	facing page	51
The All-American Canal	facing page	56
Air view of Bonneville Dam	facing page	84
A chart of the Bonneville project	page	85

Measuring cable over the Columbia River. . . .	facing page	125
Potash mine near Carlsbad, N. Mex.	facing page	125
Helium tank car	facing page	173
New Bureau of Mines buildings, Oklahoma, Mary- land, and Alabama	facing page	194
Pueblo bowl makers	facing page	209
New and old in Indian housing	facing page	231
Puerto Rico, low cost housing	facing page	281
A cement plant built by P. R. R. A.	facing page	281



VIEW OF THE NEWLY ESTABLISHED OLYMPIC NATIONAL PARK IN
THE STATE OF WASHINGTON.

THE SECRETARY OF THE INTERIOR

WASHINGTON

MY DEAR MR. PRESIDENT:

Encouraging progress in our campaign of the past 5 years to conserve the vast store of the natural resources of the United States is the keynote of the reports of the bureaus and agencies of the Department of the Interior for the fiscal year ended June 30, 1938, which are transmitted herewith.

I said last year that our citizens were in agreement with the principle that prudently managed national resources could be made to produce a far higher standard of living for the Nation over a longer period. They have also shown their willingness to support intelligent and energetic action on the part of the Government to this end.

I am gratified to be able to report that, with the passing of another year, it is becoming more evident that the people are demonstrating a greater interest in conservation; are beginning to heed our warnings that, although our resources are bountiful, they are not limitless. From the accompanying reports of the bureaus and divisions of the Department, most of which deal with some important phase of conservation, and as a result of my own first-hand observations and information, I believe that a great advance in sentiment for conservation has been made during the past year.

A court victory for the Government in the Elk Hills oil case wherein the United States sought to be declared the owner of valuable mineral lands; the establishment of the Olympic National Park in Washington as the result of legislation passed during the closing hours of the Seventy-fifth Congress; the salvage of the old Chesapeake and Ohio Canal between Washington, D. C., and Cumberland, Md., for recreational purposes; and the pending purchase by the Government of important sugar-pine groves adjacent to the Yosemite National Park in California stand out as major triumphs on the side of true conservation.

ACCOMPLISHMENTS DURING THE YEAR

It is not possible for me in a letter of transmittal to touch upon all of the many activities and accomplishments of the Department during the past fiscal year, but I shall mention some of them.

The construction program of the Bureau of Reclamation, with work in progress on 32 projects in 12 States, was the largest in history.

The base of the massive Grand Coulee Dam on the Columbia River was completed on March 21, 1938, a year ahead of schedule, and, at the close of the fiscal year, work was about to commence on Shasta Dam, the second largest concrete dam in the world and one of the key structures of the Central Valley of California project.

An act of Congress, approved August 20, 1937, set up a Bonneville Authority for the purpose of supervising and selling the electric energy generated at Bonneville Dam on the Columbia River. Mr. J. D. Ross was appointed Administrator under this act, and for the first time the Administrator's report is included in the annual report of the Secretary of the Interior.

In addition to the creation of the Olympic National Park and the successful fight to save in California one of the finest remaining sugar pine stands in the world, progress was made in the development of the Isle Royale National Park project in Michigan and in the Blue Ridge and Natchez Trace Parkway projects. An appropriation of nearly \$750,000 made possible the purchase of lands to be included within the boundaries of the Great Smoky Mountains National Park. Three new national monuments were added to the parks and monuments and additions were made to several of our national parks.

Visitors to the units of the national park system mounted to 16,233,688—a new all-time record.

For the second successive year the operations of the General Land Office resulted in a return to the Federal Treasury of 5 dollars for each dollar expended for administration. For the first time, all of the principal regulations, based upon more than 5,000 laws, have been brought together in up-to-date form and made available for general use.

The control of grazing and the regulated use of the public range has been carried forward with a harmony of purpose between the stockmen and the administration. Advancement of this sound conservation policy is shown by the fact that during the coming year, preliminary work will have been completed and temporary 1-year licenses replaced by term permits of not more than 10 years' duration in 1 grazing district in each of the 10 States affected.

From 130,000,000 acres in 1887, Indian lands were reduced to 49,000,000 acres in 1933. At the close of the last fiscal year Indian lands increased to approximately 51,540,307 acres of which 67 percent were tribally owned and 33 percent in trust allotments.

Taking advantage of the Indian Reorganization Act of 1934, which gave to the Indians, at their own option, larger responsibilities of self government, there were 82 tribes operating under constitutions and bylaws. Of this number 57 tribes had become incorporated under Federal charters.

Because the Department is charged by law with the conservation and management of large forest areas there was created, on May 18, 1938, the Office of Director of Forests for the purpose of promoting a unified and coordinated conservation policy with respect to these lands.

There was also set up within the Office of the Secretary a Division of Information, similar to organizations already existing in other Federal departments and agencies, for the purpose of disseminating to the public official information concerning the work and policies of the Department.

The Office of Education reported more than 6,000,000 students now enrolled in the 4 years of the public high schools and approximately 1,500,000 persons in night and part-time schools. Gratifying progress was reported by schools, colleges, and universities in the

teaching of conservation in its broadest meaning. Educational radio and forum demonstration projects were continued and extended.

In spite of liberal allotments of loans and grants from Public Works Administration and other emergency funds for new school construction, a survey made by the Office of Education showed a continuing shortage of school building construction.

THE ELK HILLS OIL CASE

Regulations were issued to protect from private exploitation the Nation's petroleum resources in the Teapot Dome, Wyo.; the Elk Hills, Calif., and all other portions of the approximately 70,000 acres of naval petroleum and Government helium reserves.

This was part of the Department's intensive program which has been carried on during the past 5 years to preserve these valuable deposits of oil and helium for the Nation's use and followed closely upon the finding of a Federal district court declaring section 36 in the Elk Hills to be Government property. This court decree upheld the original decision made by the Secretary of the Interior on January 24, 1935, declaring the title to these valuable mineral lands in the United States. The Department has made a similar finding with respect to section 16 in the same area.

The Solicitor of the Department of the Interior and his staff advised and conferred with special counsel for the Government in the Elk Hills oil case (*U. S. v. Standard Oil Co. of California, et al.*).

The Solicitor's Office also was engaged in the preparation and trial of the Government's case against the city and county of San Francisco to enjoin the continued violation of section 6 of the Raker Act. This suit likewise was decided in favor of the United States by the district court of the United States.

OLYMPIC NATIONAL PARK

The creation of the Olympic National Park in the State of Washington, assures the preservation of a fragment of the Pacific coast rain forest with its magnificent Douglas fir, Sitka spruce, western hemlock, and giant cedar. The largest remaining herds of the rare Roosevelt elk are also finding a refuge in this park.

On the Olympic peninsula cedar trees are standing that are 45 feet in circumference, trees from which Indian women stripped inner bark for clothing a hundred years before Columbus discovered America. In this new park there are Douglas fir 40 feet in circumference and a thousand years old.

The reservation of this area is not exclusive of or inconsistent with the right of the lumber industry to a proper and legitimate exploitation of the timber resources of this area. The manufacture of lumber is necessary to our prosperity and well being as a Nation. There is room on the Olympic Peninsula for forests for both the people and the sawmill. Assuming that the self-interest of the lumbermen is an intelligent one, we have a right to look forward to the end that this wonderful section may be put to the wisest and best use for all concerned.

Selfishness and commercialism at any cost met defeat in the closing days of the last Congress when the President was empowered to de-

termine the final boundaries of this new national park. The President's approval of the measure on June 29, 1938, fulfilled the dream of conservationists for a third of a century. It is interesting to note that the effort to create this great national park dates from the administration of President Theodore Roosevelt, who was personally interested in this area.

MORE SUGAR PINES ARE SAVED

Several years ago John D. Rockefeller, Jr., happened to be visiting the Yosemite National Park when the lumbermen's ax was being sharpened to destroy a magnificent grove of sugar pines. Mr. Rockefeller contributed \$1,644,927.12 for the purchase of this grove, his donation being matched by Federal funds. This grove is now one of the outstanding features of Yosemite. Additional thousands of acres of the dwindling supply of this rare giant will be saved from destruction under the authority conferred upon the Secretary of the Interior by H. R. 5394; S. 1791. This act authorizes the Secretary of the Interior, through the National Park Service, to acquire the Carl Inn tract of 7,730 acres of sugar pines bordering the western boundary of Yosemite National Park, Calif., as an addition to the park. The Deficiency Act of August 25, 1937, carried an appropriation of \$2,005,000 for the purchase of these trees; \$5,000 was for administration costs.

This is one of the finest sugar pine stands in the world. The act of Congress came just in time to stop the lumbermen at the edge of this grove, thus saving these exceptional trees for future generations.

Sugar-pine trees, which are rare and becoming rarer because of their value for lumber, are among the finest manifestations of Nature and rank in a class with the spectacular western redwoods. The sugar pine is a giant among trees, growing as it does to a height of 240 feet and measuring 8 or 9 feet in diameter. It grows only in California and Oregon in majestic groves and of straight, towering trees that give the impression of trying to reach to the sky.

The Department of the Interior will avail itself to the fullest possible extent of the powers granted under this legislation, which, to our way of thinking, represents a generous spirit and a cultivated imagination on the part of Congress. We are delighted at this opportunity to assist the Congress and the President in giving the country a valuable object lesson in conservation by saving these trees from the destruction that threatened them.

To my mind, it would have been little short of a crime for the country to have permitted these forest giants to be felled. So many such treasures of the Nation have already been despoiled that in years to come those who will follow us will rejoice that these sugar pines have been preserved for them.

Of the 7,730 acres to be acquired under the act of Congress, 7,172 are owned by a private lumber company which was preparing to turn the two and three centuries old trees into lumber, leaving only the desolate, sheared-off stumps and broken tops as a memorial to an outraged Nature despoiled of its beauty. This privately owned area will be acquired through condemnation proceedings if the negotiations that are now under way fail to arrive at a price which seems reasonable to the Government. Approximately 500 acres are in a national forest

and under the terms of the act will automatically become a part of the park when the private holdings are acquired.

The Department of the Interior for many years has sought to preserve this forest, in conformity with the policy of the National Park Service to save for future generations outstanding examples of America's flora, scenic and recreational areas by protecting them from commercial exploitation.

ADDITIONS TO THE PARK SYSTEM

Three new national monuments were added to the park system. They are the Capitol Reef National Monument in Utah, Pipestone National Monument in Minnesota, and the Channel Islands National Monument in California.

The boundaries of Hawaii National Park were extended and the Hot Springs National Park was enlarged. The Salem Maritime National Historic Site was established.

The Senate Committee on Public Lands was authorized to investigate the suitability and feasibility of extending the Grand Teton National Park in Wyoming by including the Jackson Hole country and an area in the Teton National Forest which surrounds Jackson Lake. The Senate also directed an inquiry to determine the suitability of enlarging the Petrified Forest National Monument in Arizona into a national park.

During the year the Park Service investigated 24 new areas for possible inclusion in the Federal park system.

Additions to the Nation's parks during the year brought the number of areas to 144 and the total acreage to 19,187,933.

As a result of the continued Historic American Buildings Survey, information is now available on more than 7,000 early American buildings.

Winter sports enjoyed a phenomenal growth and popularity throughout the national parks during the winter of 1937-38 and advisory committees on camping, hiking, and skiing were appointed.

Serious thought has been given to the problem of providing recreation for the heavy Negro population of the deep South.

The number of forest fires reported in the western national parks was the lowest since 1930.

With a total staff of 125 naturalists, the Park Service contacted 4,500,000 visitors through lectures and nature trips in the parks during the year. Dioramas, photographs, paintings, and models were displayed at 15 expositions.

Over 3,000,000 seedlings, obtained from the Soil Conservation Service, were planted in recreational demonstration areas for the purpose of assist ng in erosion control or to reforest cut-over or burned-over lands.

A comparison of the concession service in the national parks during the last year with 10 years ago shows an interesting trend. Before the 1929 depression substantially all the profits of the park operators were earned from sightseeing transportation and first-class American-plan hotel accommodations. Today the profit-producing facilities are the low-priced cabin accommodations, cafeterias, coffee shops, and grills. Although the transportation and first-class hotel accommodations still furnish the greater portion of the operator's revenues,

they are not so self-supporting as the newer types of accommodations.

As of June 30, 1938, there were 140 corporations, firms, and individuals under contract or permit to furnish accommodations to the public as compared with 131 as of the beginning of that fiscal year and 89 as of 10 years earlier.

The furnishing of accommodations to park visitors through private corporations and individuals in many instances has not worked out satisfactorily. There is an element of inconsistency in permitting concessionaires to operate on Government property. It is hoped that the Congress will give serious consideration to this problem with a view to adopting a policy that will be for the best interest of the Government and of the public.

The Federal Park System now comprises 27 national parks, 73 national monuments, 11 national military parks, 11 national cemeteries, 8 national battlefield sites, 8 national memorials, 1 national recreational area, 1 national historical site, 1 national parkway, 3 national parkway projects, 2 national historic parks, and the National Capital Parks unit. The net increase in the Nation's park and monument system through the adjustment of the boundaries of existing areas and through lands acquired amounted to 1,846,377.363 acres.

At the close of the fiscal year the National Park Service was responsible for the maintenance and operation of 21,122,615 square feet of floor space in the District of Columbia. Of this total 18,303,567 square feet were in 46 Government-owned buildings and 2,891,048 square feet in 64 privately owned buildings.

RECLAMATION

Demand from many sources, including those of refugees from drought areas, for farmsteads on Federal reclamation projects continued very high during the year. For 69 farm units opened for homestead on the Klamath project in northern California, 1,280 formal applications were filed.

On 35 operating projects in 16 semiarid Western States water was provided by federally constructed works for the irrigation of 3,034,769 acres of former desert lands. The crops harvested from these areas had an average value of \$39.09 per acre. The water supply for the projects was ample, with one exception during the 1937 irrigation year, and at the outset of the 1938 season the prospects were bright for a very good water year.

During the year the Repayment Commission, created by the act of August 21, 1937, recommended and the Secretary granted an extension of time in the payment by project water users of \$300,331 due under repayment contracts. This sum represented approximately one-tenth of that due during the year. The Repayment Commission also drafted its report on Federal and Indian reclamation projects, and this was transmitted to the Congress.

The appropriation act for the Department for 1939 marked a step forward in the matter of new support for the Reclamation fund. This act provided for an immediate increase in the Reclamation fund and carried a clause setting up a new source of accretions to the fund which will, in part, replace the dwindling revenues from the sale of public lands.

Work was in progress on 32 projects in 12 States under the largest Reclamation construction program in history. Thirteen major dams were being built in western stream beds, two having been started during the year. Six dams were completed during the year, bringing to a grand total of 147 the number of dams constructed by the Bureau of Reclamation since it began operations.

The base of Grand Coulee Dam was completed, and a new contract was awarded for the completion of the dam to its full height of 550 feet. This contract alone involves the placing of 5,809,500 cubic yards of concrete.

Large-scale construction was started on the Central Valley project in California. Problems preliminary to the commencement of work in most branches of this wide-flung undertaking were solved. Bids were opened before the close of the year for the building of Shasta Dam, the key structure of the project.

Additional generating units were installed in the Boulder Dam power plant. Energy was delivered continuously throughout the year to Los Angeles and other municipalities from the Boulder powerhouse. A total of 1,427,928,442 kilowatt-hours of energy was sold for a gross revenue of \$1,888,132.84. Work progressed rapidly on the All-American Canal, where all the principal structures were under construction.

The President approved, on December 21, 1937, the finding of feasibility, and thereby cleared the way for the commencement of construction of the Colorado-Big Thompson project in Colorado, the most important of the new projects.

BUREAU OF MINES

Too often sight is lost of the achievements of our purely scientific organizations—the Bureau of Mines and the Geological Survey.

The Bureau of Mines has continued its dual program of mineral and human conservation.

The accident rate in mining has been much lower during the past 5 years than in any other period for which statistics are available. The excellent safety records of numerous mining companies working under hazardous conditions show definitely that mine accidents in this country can be reduced at least 75 percent if proven practices are followed strictly.

By the beginning of the new fiscal year the Bureau of Mines had trained 1,146,854 persons in safety courses.

The Bureau has devised and patented a process for producing 99.7 percent pure manganese metal from low-grade domestic ores and has conducted tests on a variety of American clays to determine whether they can be used for wares as attractive and sturdy as expensive, imported ceramics.

The Bureau of Mines also has pioneered in conducting tests on coal hydrogenation, a process already applied in England, Germany, and Japan for obtaining oil from coal. By the time that our oil fields approach depletion (and I have been insisting for years that unless our oil producers are more careful this day is rapidly approaching), it is hoped that motor fuel from other sources can be supplied so efficiently and cheaply that the transfer can be made without drastic economic adjustment.

Experts in the Bureau have been giving their special attention to the strategic minerals that are vital to industry and indispensable in war.

The Director of the Bureau of Mines reports that a factor which contributes to the waste of our mineral resources is unrestrained production that results in stock piles that frequently deteriorate before they are used. A way would be open to enable the Government to check this overproduction if we could determine the Nation's requirements of the principal minerals. I am in favor of legislation which will permit this Department to make this determination in the interests of national defense as well as in the interests of conservation of natural resources.

Through funds made available by the Public Works Administration the Bureau of Mines has increased its facilities by the construction of the southern experiment station at Tuscaloosa, Ala., the eastern experiment station at College Park, Md., and a new laboratory at the petroleum station at Bartlesville, Okla.

HELIUM

The Government's helium plant at Amarillo, Tex., produced 6,100,000 cubic feet of helium during the fiscal year of 1938, an increase of 1,300,000 cubic feet over the previous year, mainly for the use by the Army and Navy in nonrigid airships. This production was only about one-third of the quantity which a foreign nation desired under the terms of the amended helium act permitting export under certain conditions. No helium was exported because the Secretary of the Interior was not persuaded that the supply sought was not of military importance under the provisions of the act.

The Government acquired during the year certain private helium-bearing lands in accordance with the amended helium act. This gives to the United States a virtual monopoly of the world's helium supply. Helium was supplied to the United States Public Health Service for medical studies, the Bureau of Standards for research and the Weather Bureau for the inflation of small meteorological balloons. The Weather Bureau has requested 450,000 cubic feet of helium for this purpose during the next fiscal year. Approximately 70,000 cubic feet of the gas were delivered during the year for medicinal and scientific purposes, and helium-oxygen mixtures for the treatment of respiratory diseases are now available in all parts of the country.

GEOLOGICAL SURVEY

The Geological Survey sent out 63 geologic parties in 35 States and Alaska during the year. Flood studies were continued and measurements of stream flow were maintained at 3,831 stream-gaging stations.

Mineral production from public and Indian lands and the naval oil petroleum reserves under the supervision of the Survey had an estimated value of \$88,500,000. The revenues accruing therefrom amounted to about \$9,750,000.

The piercing eye of the X-ray machine was used more than ever before by Survey scientists last year to reveal secrets which might lead to the advancement of the conservation of natural resources. The Director of the Survey reports that it is now possible to show that

the physical properties of a mineral depend not only upon the kinds of atoms composing it, but also upon their role and arrangement in the crystal—features that can be determined by X-rays. The densities of strata, rocks, and minerals likewise, in the final analysis, are determined in the same way. It seems reasonable to expect that further study of the associations and conditions of the formation of minerals will yield illuminating correlations with both their chemical composition and physical structure.

The work of the Geological Survey during the year was basically important in the general program of conservation and there is included in the Director's report a State-by-State recital of its operations. Special investigations included a study of the base exchange properties of river clays, which are expected to afford a correction of the previously calculated age of the ocean.

A temperature survey was made of a 7,000-foot well near Washington, Pa.

Of the total area of the United States, 45 percent has been covered by topographic maps, the year's increment amounting to 0.02 percent. The reduced percentage, as compared with 47.4 percent reported in 1937, is due to the fact that during the year maps of 79,668 square miles, based on reconnaissance surveys prior to 1896 and considered inadequate, have been withdrawn from distribution and the areas declared to be unmapped.

The production of petroleum from public lands in 1938 was substantially greater than in other recent years; the production of gas was approximately the same as in 1937; the production of natural gasoline was substantially less than in other recent years. The production from 519 wells on naval petroleum reserves No. 1 and No. 2 in California and No. 3 in Wyoming aggregated 4,238,533.36 barrels of petroleum, 2,395,996,000 cubic feet of natural gas, and 10,581,504 gallons of natural gasoline and had an aggregate royalty value of \$1,020,444.84.

INDIANS

Indians are now increasing at twice the rate of the population as a whole.

In 1887 the Indian had left only 130,000,000 acres. In 1933 these had been reduced to only 49,000,000 acres, most of it waste and desert land. At the end of the last fiscal year the Indian land area had been increased to approximately 51,540,307 acres; 67 percent of this was tribally owned and 33 percent was in trust allotments. During the last fiscal year 64,354.85 acres costing \$1,216,725.14 were purchased for Indian land. In addition, 38,279 acres of former Indian land which had been opened up to sale or entry were restored to tribal ownership or a reservation status.

From 1935 through the fiscal year 1938, 30 purchase projects have been conducted by the Commissioner of Indian Affairs in cooperation with the governmental agencies now merged in the Farm Security Administration. Options in the amount of \$3,521,057, covering 1,207,916 acres in 11 States, have been accepted, and purchases were completed to the extent of 94 percent. By Executive order, on January 18 and April 15, 1938, the President transferred jurisdiction of approximately 791,405 acres of these lands from the Department of Agriculture to the Department of the Interior.

The act of May 31, 1938, authorized the Secretary of the Interior to withdraw and reserve permanently tracts of land not to exceed 640 acres each of the Alaska public domain for schools, hospitals, and other purposes necessary to aid the Indians, Eskimos, and Aleuts.

Conservation, for the benefit not only of the Indian, but of the whole Nation, is, of course, the controlling policy in the administration of Indian grazing and forest lands. In no other field does the Government have such an opportunity to prove what can be done in the way of conservation and the proper land use as it does in the supervision by the Indian Service of the Indian domain. The Indian Service, by virtue of its position as guardian of Indian lands, can apply a concentrated knowledge and action directed to the problem. In the management of the Indian's forest resources, as in the management of the range lands, conservation is the watchword. Depletion of the timber supply is geared down to the rate of tree reproduction so that the Indians may enjoy their forest resources in perpetuity. It is estimated that 426,000,000 feet of timber were cut during the fiscal year 1938 from the 33,000,000,000 feet of timber on Indian lands. The gross income to the Indians from the sale of this timber was \$1,175,000.

The average Indian family of four had an income for the year 1937 amounting to approximately \$600. This figure includes earned and unearned income as well as nonmoney and money income.

During the past year the Indians Arts and Crafts Board initiated a number of policies, including a system of marking to prove the authenticity and quality of Navajo, Hopi, and Pueblo silver products and of Navajo textiles; the development of a home spinning industry in eastern Oklahoma with an organization of 75 spinners; and the formation of arts and crafts groups on three Dakota reservations. Survey work in Indian arts and crafts looking toward improved production has been carried on in North Dakota, Alaska, and North Carolina.

Indian boarding schools have decreased in number and day schools have greatly increased. In 10 years, the Indian day school population has risen from 4,532 to 14,087. Moreover, day schools have become popular in many instances with adult Indians, and there are cases where a larger number of adults than children have used the day school rooms. Improved practice in hygiene, sanitation, and soil conservation are being taught adults and accepted by the Indians. Community discussions of tribal affairs, extension demonstrations, and other community activities for the adult Indians are being developed through the day schools.

Under the Indian Reorganization Act since 1934, 82 tribes totaling 93,520 Indians were operating under constitutions and bylaws; and of these 57 tribes with a membership of 64,000 Indians have become incorporated under Federal charters. Under these constitutions and charters the Indians have an increasingly large sphere of self-government.

On July 1, 1937, there were authorized in the Indian field service and Alaska 6,933 permanent year-round positions. On April 30, 1938, there were 3,916 Indians employed in the Indian Service, of whom 3,627 were in regular year-round positions. Approximately one-half of the regular employees of the Indian Service are Indians. Slightly more than 40 percent of the Indians employed are full-bloods.

DIRECTOR OF FORESTS

The Office of Director of Forests was established May 18, 1938, to promote a unified policy of forest conservation on all of the lands under the jurisdiction of the Department of the Interior.

By law the Department of the Interior is charged with the conservation of a variety of forests and forest lands. These forests range from the primeval growths in the national parks, which are preserved for the inspiration and enjoyment of our own and future generations, to the intensive commercial development of the revested and reconveyed forest lands in Oregon.

Under the act of August 28, 1937, the Department of the Interior was given new and widened responsibilities for forest conservation over these Oregon lands. A basis was laid for a new type of cooperative conservation which, if successfully carried out, will provide a new approach to the practice of forestry in this country. It is my hope that this new approach shall be successful and for this and other reasons I have established the Office of the Director of Forests.

Not only did the act of August 28, 1937, provide this new approach, but for the first time in our history a plan of sustained-yield management for a specific Federal forest property was authorized and outlined in American forest law. The experience of the Department with the forests on Indian lands, from which 92 percent of the gross receipts are returned to the Indians, has shown that planned, sustained-yield management of forests cannot only be successful but that it can be carried out with low administrative costs.

In addition to the national park, Oregon, and Indian forests, the Department of the Interior has jurisdiction over lands in the United States and Alaska where forests are principally administered for watershed protection. While it is obvious that the uses of these different forest lands vary, it is also clear that there are certain fundamental forest principles and techniques, such as fire protection and insect control, as well as the basic policy of the Department, conservation, which apply to all of these areas.

The establishment of the Office of the Director of Forests in this Department will not only make possible the coordination, unification, and promotion of sound basic techniques, principles, and policies for the conservation of all the forest resources under the Department, it also marks a progressive step forward, in accord with the best principles of modern administration, in carrying on the conservation work of the Department.

GRAZING PROGRAM

Progress in the program of range use control is indicated by the fact that, with the completion of preliminary surveys and classification work, temporary 1-year licenses will be replaced during the coming year by term permits of not more than 10 years' duration in 1 grazing district in each of the 10 States affected, namely, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming. Installation of the term permit system in all of the 50 Federal grazing districts will be undertaken as rapidly as survey and classification of the 120,000,000-acre Federal range can be completed.

Grazing licenses were issued to 18,752 stockmen owning 9,050,771 head of livestock in 48 grazing districts during the year.

Twelve grazing districts established in 1937 were placed under regulation for the first time in 1938. The amount of Federal range involved in these 12 districts in Idaho, Montana, Oregon, Wyoming, and Nevada, was 30,086,579 acres. The increase in licenses resulting from the addition of these districts was 3,685 and the increase in the number of livestock using grazing districts under regulation was 3,476,148.

The entire public range of about 120,000,000 acres is being surveyed and classified for its proper use and rehabilitation, and more than 20,000 private properties dependent thereon are likewise being appraised.

Forty-five C. C. C. camps operated by the Division carried on a range improvement program which not only relieved present range conditions but also furnished future means for the conservation and protection of the 120,000,000 acres of range land. Under this program more than 1,401,378 acres of the Federal range have been treated for control of ground squirrels, gophers, prairie dogs, kangaroo rats, and jack rabbits, and 98,798 acres were treated for the eradication of poisonous weeds. Protection of wild animals and game birds on the Federal range was assured through the reservation of approximately 8,000,000 acres of land within the boundaries of grazing districts for their use. In addition, more than 3,500,000 acres have been set aside on the public land in three game ranges to be administered jointly by the Division of Grazing and the Biological Survey of the Department of Agriculture. Sixteen wildlife refuges, aggregating in area approximately 4,000,000 acres of public land, have been withdrawn from other uses by Executive order and placed under the Department of Agriculture for the sole purpose of propagating and protecting wildlife.

C. C. C. activities included the transplanting of beaver in small streams in Idaho. An increase in the beaver population has resulted in arresting stream bed erosion and the consequent loss of soil, and in increasing the water supply and stock-watering facilities.

Although 20,752 applications for grazing licenses were filed, satisfaction of stockmen with Division of Grazing operations is indicated by the fact that appeals from decisions were made in only 420 cases.

In Oregon about 500 unclaimed wild horses were removed from grazing districts after being rounded up on the range by airplane and disposed of in accordance with State law and rules of the range. A comprehensive system of fire prevention and control on the public lands in Arizona was established by agreement between the Division of Grazing, the Indian Office of the Department of the Interior, and the Forest Service of the Department of Agriculture. The elimination of 50,000 sheep and 10,000 cattle from the public range in Wyoming was accomplished without any of the affected stock growers requesting a hearing. In this practically new Division of Grazing region, violations of range rules were exceptionally few, only six being reported.

ADVANCES IN EDUCATION

More than 6,000,000 pupils are now enrolled in the 4 years of the public high schools, which, with the addition of private school enrollment, brings the total high-school enrollment to more than six and one-half million. Enrollment in night and part-time schools amounted to approximately one and one-half million persons. Of the 300,000

enrollees in the Civilian Conservation Corps camps, 90 percent participated in the educational program.

Pennsylvania was the third State to provide a parent-education program by legislative action. The other States with such programs are New York and California. Parent-education programs were sponsored through the public school systems in 36 cities.

The President's Advisory Committee on Education submitted its report to the President on February 18, 1938. The committee recommended continuing the present Federal grants and inaugurating a program of new grants to the States for educational purposes with Federal appropriations beginning at \$70,000,000 in 1939-40, and increasing to \$199,000,000 in 1944-45.

SCHOOL BUILDINGS

Despite the fact that from December 1933 to December 1936, the Public Works Administration allotted more than \$244,000,000 in grants and loans for public school buildings, the total estimated cost being more than \$469,000,000, a survey showed that in 62 percent of cities with 10,000 population or more, an additional \$496,000,000 were needed for school construction. The principal reason given for this need was the lag in school building construction during the World War.

RADIO, FORUMS, AND LIBRARY

Through the educational radio project three major programs were produced during the past fiscal year. *Brave New World*, a program based on the good neighbor policy and dealing with Latin America, won first prize as an educational dramatic radio series from the Ninth Annual Institute of Education by Radio. The program, *The World Is Yours*, produced in cooperation with the Smithsonian Institution, ran for 51 weeks. *Education In The News* was also broadcast.

Forum demonstration projects were conducted under the sponsorship of the Office of Education in 18 areas of the country during the fiscal year.

For the first time in its 70 years, library facilities have been adequate for the Office of Education in the new quarters of the consolidated library in the Department of the Interior building. A Library Service Division was organized.

College art was given encouragement by the establishment of a college arts section in the Fine Arts Gallery of the Department.

C. C. C. AND VOCATIONAL EDUCATION

During the past fiscal year 3,517 C. C. C. enrollees received elementary school diplomas, 634 received high-school diplomas, and 13 were awarded college diplomas or degrees. More than 8,800 illiterate enrollees were taught to read and write during the year. The War Department is responsible for the administration of the C. C. C. program, but the professional direction of the educational program is a function of the Office of Education acting in an advisory capacity to the War Department.

The Office of Education continued to carry on activities in the field of vocational education and vocational rehabilitation under the authority of eight separate acts of Congress. Under these acts the

Office of Education cooperates with the States in promoting vocational education in agriculture, the trades and industries, home economics, business education, and in rehabilitating for employment persons disabled through accident, illness, or congenital causes.

TERRITORIES AND ISLAND POSSESSIONS

Canton and Enderbury Islands in the Pacific Ocean were placed under the administrative jurisdiction of the Department of the Interior by Executive order of March 3, 1938. Colonists from Hawaii were landed, the American flag was raised, radio facilities were established, and lighthouses and living quarters were built.

The Matanuska Valley colonization project in Alaska also has been placed under the jurisdiction of the Department, but since the transfer was made by the Works Progress Administration after the close of the last fiscal year a report on its operations is not included herein.

The Territory of Hawaii reported an increase in business and a favorable trade balance. The value of pineapple products increased by \$4,000,000, while the value of sugar exports decreased by approximately the same amount.

The finances of Puerto Rico were in excellent condition last year, receipts being \$43,298,448 while expenditures were \$41,666,329.

The Virgin Islands suffered from a severe drought which did considerable damage to its sugar crop.

REHABILITATION IN PUERTO RICO

The fundamental economic problem in Puerto Rico is due to the fact that while the island is essentially agricultural, having little or no industry, its important crops—sugar, coffee, and tobacco—because of existing legislation or lack of markets, will not support the dense population.

As a consequence, efforts to encourage the production of diversified crops, and utilization of the yield of the land in the manufacture of byproducts, formed an outstanding feature of the Puerto Rico Reconstruction Administration program during the past fiscal year.

Arrangements have been made for the construction of a mill for the manufacture of butyl alcohol and acetone as byproducts of molasses obtained from sugarcane which is the principal crop of the island. Financed by a Puerto Rico Reconstruction Administration loan to the Asociacion Azucarera Cooperativa Lafayette, this plant, having a capacity of 5,000,000 pounds of these solvents annually, is expected to be in operation by January 1, 1939.

Although the Central Lafayette, the island's first cooperative enterprise, had the fourth largest sugar crop in its history, the seriousness of the sugar situation is more readily understood when it is made known that more than 100,000 acres of good cane land, capable of employing more than 25,000 laborers, is now lying idle as a result of the marketing quotas fixed by the Congress. The development of byproducts has been undertaken by the Puerto Rico Reconstruction Administration to find an escape from this dilemma.

A wider use of its agricultural lands, which may make Puerto Rico a strong competitor with foreign countries in the production and marketing of vanilla, is included among our plans for conservation and economic rehabilitation. A pilot plant to cure the vanilla bean

will soon be completed and by 1942 it is expected that Puerto Rico will be in competition in the mainland markets with foreign countries which now produce vanilla oils.

Meantime the Puerto Rico Reconstruction Administration carried forward other phases of its program including rural rehabilitation, electrification, health and recreation projects.

Since the appointment of the Secretary of the Interior as Administrator of the Puerto Rico Reconstruction Administration the average overhead has been reduced from \$140,000 to about \$65,000 a month. The rehabilitation program has also been sharply cut to keep within the reduced appropriation.

PRESIDENT APPOINTS TWO NEW AIDS

The Honorable Ebert K. Burlew, of Pennsylvania, was sworn in as First Assistant Secretary of the Interior on April 8, 1938, and the Honorable Harry Slattery took the oath of office as Under Secretary of the Interior on June 17, 1938. Both Mr. Slattery and Mr. Burlew have been valued members of my staff and I wish to express to you, Mr. President, my appreciation of their appointment to ranking positions in this Department.

Mr. Slattery served in the Department under the administration of the late Franklin K. Lane and he returned to the Department in 1933 at the instance of the present Secretary of the Interior under whom he served as personal assistant. The appointment of Mr. Burlew is especially significant because he is a career man with almost 30 years of service in War, Post Office, and Interior. He was brought to the Department of the Interior from the Post Office Department by Secretary Work. He has been the chief administrative officer of the Department under the present administration and has had general supervision over personnel and budget matters.

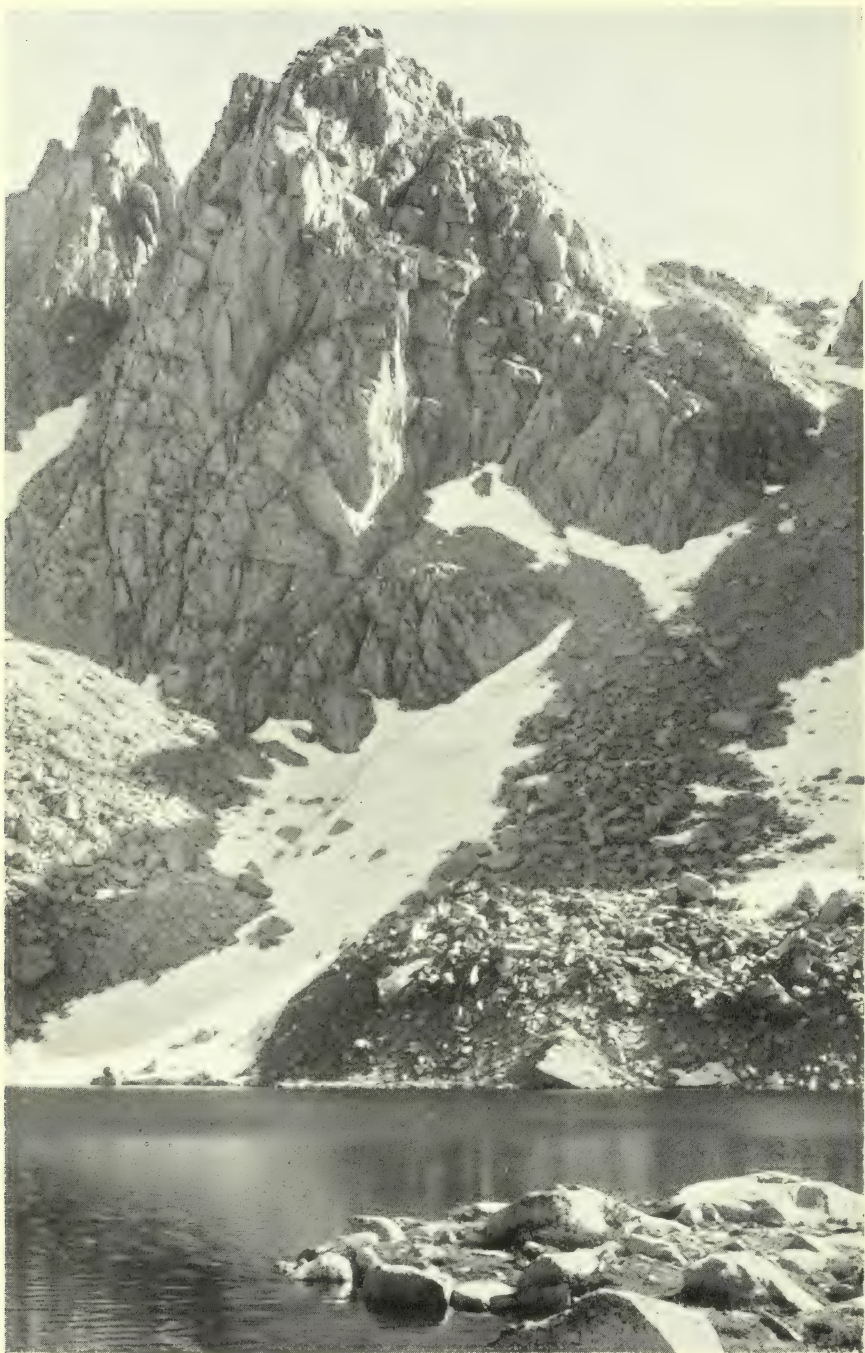
In closing, I again renew my recommendation that the name of the Department of the Interior be changed to that of the Department of Conservation.

Legislation is now being prepared with the object of carrying forward our program of conservation. From time to time drafts of these bills will be submitted to you for your consideration.

Very respectfully,

HAROLD L. ICKES,
Secretary of the Interior.

The PRESIDENT,
The White House.



THE KINGS RIVER REGION IN CALIFORNIA, WHICH HAS BEEN PROPOSED FOR A NATIONAL PARK.

THE NATIONAL PARK SERVICE

Arno B. Cammerer, *Director*

THE conservation program of the National Park Service made steady advances during the 1938 fiscal year. Changes in the administrative set-up resulted in greater efficiency. Cooperation with State and other local governments in park establishment and management emphasized the leadership of the Service in this field. Developments and improvements marked all phases of the Service's conservation program. New theories were tested, policies adjusted to changing conditions, and where necessary new methods adopted.

The full regionalization of all National Park Service activities, put into effect during the year, has functioned with marked success. Land for Region Three headquarters at Santa Fe, N. Mex., was donated to the United States by the Laboratory of Anthropology, and the headquarters unit, of typical southwestern architecture, is now under construction. The site of the headquarters adjoins the laboratory grounds, making the rich resources of that institution readily available to the research staff and other officials of the Service.

A conference of National Park Service executives, park operators, and representatives of cooperating Government agencies was held in Washington, January 17 to 22. During the last 2 days of the conference joint sessions were held with the American Planning and Civic Association, with conservation and recreation the principal topics under consideration.

The President of the United States heads the list of American citizens enjoying their Federal parks. He spoke at the ceremonies incident to the observance of the seventy-fifth anniversary of the Civil War battle at Antietam, and at Roanoke Island, within the area of the proposed Cape Hatteras National Seashore, on the three hundred and fiftieth anniversary of the "Lost Colony" Settlement. The President also visited Yellowstone National Park, Mount Olympus National Monument (now included in the new Olympic National Park), and Fort Jefferson National Monument.

During the year ended September 30, 1937, total travel to the various units of the Federal park system reached an all-time high of 15,133,432. The season ended September 30, 1938, saw 16,233,688 visitors to these areas; a new record.

Early summer touring of the national parks has not kept up this accelerated pace, although still above that for the corresponding period last year. An interesting commentary in this connection is that in several regions use of the Federal park areas held up well despite generally poor economic and travel conditions. Historic areas continued to draw increasing numbers of visitors.

The establishment of the Olympic National Park was achieved in the closing hours of the Seventy-fifth Congress. This major conservation achievement assures the preservation of an adequate representation of the magnificent rain-forests of the Olympic Peninsula and also protects the greater part of habitat necessary to maintain the rare Roosevelt elk.

An item of \$743,265.29, appropriated through the Second Deficiency Act of 1938, makes possible the purchase of the lands still to be included within the authorized boundaries of the Great Smoky Mountains National Park. It is hoped that these lands and those within boundaries approved for the Isle Royale and Olympic National Park projects may be acquired in time to dedicate the areas formally to public use within a year.

Through an appropriation of \$2,005,000 made available in the Third Deficiency Act of 1937, the Service is in process of acquiring 7,730 acres of majestic sugar-pine forest adjacent to Yosemite National Park for addition thereto. This is one of the finest sugar-pine stands in the world, and its acquisition for addition to Yosemite National Park is of particular importance because America's acreage of giant sugar pines is fast dwindling.

The Jackson Shrine—the little frame house in which General Stonewall Jackson died after receiving a fatal wound at the Battle of Chancellorsville—was donated to the United States by the Richmond, Fredericksburg & Potomac Railroad Co., and added to the Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park.

The Salem Maritime National Historic Site, established by designation of the Secretary of the Interior, is the first area of its type to be established under the national policy for historic preservation embodied in the Historic Sites Act of 1935.

Changes in the Federal park system brought the number of areas from 140 to 144 and the total acreage from 17,049,505.80 to 19,187,933 acres.

In addition to its administration of park areas, the Service maintained and operated 110 Federally owned and rented buildings and 7 memorials and other special structures in Washington. Similar service was rendered in 11 Government-owned buildings in 9 cities other than Washington.

The Service continued development of 46 recreational demonstration areas; supervised plans and construction of the Blue Ridge and Natchez Trace Parkways, and extended work on the George Washington Memorial Parkway; supervised estimates and expenditures for the Mount Rushmore Memorial in Custer State Park, the George Rogers Clark Memorial in Indiana, and the Commission of Fine Arts; and cooperated in the Public Works, Civilian Conservation Corps, Works Progress, Emergency Relief, and other emergency programs. As a result of extensive studies, a definite statement of the major objectives involved in planning for the Jefferson National Expansion Memorial at St. Louis was formulated and approved, and extensive research is under way to determine the form the memorial should take. The Service is also the executive agent of the Thomas Jefferson Memorial Commission of Washington.

Plans were completed for the Government to acquire the historic Chesapeake and Ohio Canal, once a famous waterway between Washington and Cumberland, Md. Plans include its restoration for recreational purposes in addition to the restoration of some of the historic lock houses, taverns, and other structures.

As a result of the Historic American Building Survey, information is now available on more than 7,000 early American buildings. During the past year 2,000 measured drawings and 1,800 architectural photographs of historic structures were added to the Survey's growing collection in the Fine Arts Division of the Library of Congress.

The historic sites survey is being prosecuted under 15 broad themes believed to be the most important and far-reaching phases in the social, economic, cultural, and political development of the American people. Groundwork was laid last year for a similar survey in the field of archeological sites.

At the close of the year donations to the National Park Service Trust Fund amounted to a total of \$12,000. Cooperation with State governments in making a study of park, parkway, and recreational-area needs was continued, advice and assistance furnished State and local planning and conservancy agencies, and development of State and other local park areas continued through the medium of the Civilian Conservation Corps.

The United States Travel Bureau continued to function with emergency funds. Offices were maintained in New York and Washington. Legislation to establish the Travel Bureau on a permanent basis unfortunately failed in the Seventy-fifth Congress, but its introduction early in the Seventy-sixth Congress will be requested.

Conservation study programs initiated and conducted in connection with the John Muir Centenary were widely acclaimed by conservationists and educational institutions. A broad radio program also was carried on in Washington and in the field. One weekly radio

series initiated by the Service was piped into the high schools of New York City through the municipal station and also was used by a number of colleges and universities throughout the country, as well as by many commercial stations. The Easter sunrise national broadcast, picked up from areas in each of the country's time zones, was unusually impressive.

The lecture series given in the Interior Department auditorium for the purpose of stimulating an interest in the Federal parks was most successful. Beginning October 13, 1937, 19 lectures were given, attended by a total of 15,304 persons—an increase of more than 38 percent over the 1936-37 attendance record. In addition to capacity audiences at a number of the talks, at times several hundred persons had to be turned away.

Winter sports enjoyed a phenomenal growth in popularity throughout the national parks during the winter of 1937-38.

Special advisory committees on camping, hiking, and skiing were appointed by the Secretary of the Interior to assist the Service in formulating policies and practices concerning these popular recreational activities.

Serious thought has been given to the problem of providing recreation for the heavy Negro population of the Deep South. As a direct result of National Park Service activity in this regard, the public has become aware of this need, and steps have been planned and in some cases action consummated to provide for the leisure time of the southern Negro population.

The forest protection record through the Federal parks was unusually gratifying. The number of forest fires reported in the western national parks was the lowest since 1930. Through an intensive educational campaign, the cooperation of visitors was obtained in forest protection.

The Safety Division, established last year to reduce fire losses and accidents to visitors and employees, has proved a decided asset to the Service.

Radio communication service in the national parks and monuments proved invaluable in fire protection and other work. Outstanding service was rendered in several flood and storm emergencies. Mount McKinley National Park in Alaska was provided with radio communication facilities for the first time.

The Director of the National Park Service continued to act as a member of a wide range of commissions, in connection with his Federal park administration. He is vice chairman and executive officer of the National Capital Park and Planning Commission; member of the District of Columbia Zoning Commission, the Washington-Lincoln Memorial-Gettysburg Boulevard Commission, the National Park Trust Fund Board, the Alley Dwelling Authority of

Washington, and ex officio of the Fredericksburg and Spotsylvania County Battlefields Memorial National Park Commission, and the Petersburg National Military Park Commission; and the representative of the United States on the International Commission on Historic Monuments.

The National Park Service reports with regret the death of Archibald M. McCrea, member of the Advisory Board on National Parks, Historic Sites, Buildings, and Monuments, and of Dr. George Bird Grinnell, world-famous naturalist, who made outstanding contributions to the cause of preservation of national parks.

REGIONALIZATION PROVES HIGHLY EFFECTIVE

The regionalization of all National Park Service activities approved during the 1937 fiscal year went into effect August 1, 1937, and functioned efficiently and effectively. Establishment of closer relationships with executives charged with various administrative units of the Federal park system and acceptance of a greater degree of responsibility for regular and emergency programs in those areas were the most marked results of the transition from the previously existing emergency regionalization to the present national park regional organization.

Roughly, Region One, with headquarters at Richmond, Va., covers the eastern seaboard and the Deep South. Region Two, with headquarters at Omaha, Nebr., covers what are known as the Middle Western States and extends west to Yellowstone National Park. Region Three, headquarters, Santa Fe, N. Mex., covers the Southwest. Region Four, headquarters in San Francisco, covers the Pacific coast, extending eastward to include Glacier National Park.

A review of the first year of regionalization and an appraisal of its value to the areas of the Federal park system and to the Washington office indicate that the functioning of the four regions has wrought a definite improvement in the methods of handling certain phases of park work, particularly in the field of public contacts.

Personal contacts by regional officers with local public officials, influential groups, and representatives of other Government agencies engaged in allied work have been possible and continuous, resulting in a better understanding of the objectives of the Service in the scheme of Federal conservation. Regional contacts with the public generally have led to a quickened interest in National Park Service affairs on the part of the public and to a growing appreciation of the ideals and objectives of the Service in matters dealing with the conservation of our scenic, scientific, and recreational resources.

In addition to achieving better coordination of field activities as a whole, regionalization greatly facilitates the investigation of the many areas proposed for inclusion in the Federal park system.

COMMERCIAL DESPOLIATION OF YELLOWSTONE LAKE AGAIN THREATENED

Yellowstone National Park, first of the national parks to be established, model of parks in this country and abroad, again is threatened with despoliation of its scenic beauty. (See Annual Report of 1920.) Bills (S. 3925 and H. R. 10469) introduced in the last session of Congress had for their purpose the diversion of the water of Yellowstone Lake for commercial irrigation purposes. Construction of a dam and tunnel within the park area is a part of the scheme.

This proposal, the latest in a series of attempted raids on the Yellowstone involving the use of its waters for irrigation purposes since 1919, met instant resistance in the Department of the Interior and aroused widespread alarm and indignation among conservationists.

In a period when the need for conservation of natural resources is widely recognized and methods to achieve it are receiving serious study and consideration, the idea of diverting the waters of the Yellowstone for commercial purposes is a backward movement, and one that, followed to its logical conclusion, would result in emasculation of the entire national park system.

Use of the waters of the Yellowstone for commercial purposes would be contrary to the basic laws and purposes of national park creation. It would result in the eventual despoliation of that lake and other lakes, and eventually of a large part of the park itself. It also might disrupt geyser and hot spring activity. The precedent thus established would undoubtedly lead to enormous pressure for similar commercial concessions in other important areas of the Federal park system.

Such abuse of the parks not only would ruin their scenic beauty, but in the long-run would prove a boomerang to the communities which would receive immediate benefit were the the park waters tapped. A recent survey of business conditions in the State of Wyoming, which, with the Department of the Interior, also is strongly opposed to the diversion, indicates that visitors to the Yellowstone and Grand Teton National Parks during the 1937 travel year spent \$14,221,713 of "out State" money in Wyoming. A Yellowstone used for commercial purposes would mean loss of much of that revenue.

From a strictly ethical standpoint, to permit the diversion of the waters of Yellowstone National Park for commercial purposes would break faith with the men who by their vision and generosity made possible its establishment.

It will be remembered that at the close of the 1870 exploration of the Yellowstone country, the various members of the party had plans for preempting certain sections of it for their own use, in accordance with current land practices. At the suggestion of one of their number, these men gave up all idea of personal profit that the

wonderland might be preserved for posterity as a public park. They had the moral and legal right to claim the land and pass it on to their heirs or sell it to others who would so devise it. Since they did not do so, it should remain inviolate for the purposes for which they gave it to the people.

SHORTAGE OF PRINTED INFORMATIONAL LITERATURE

The National Park Service is placed in the anomalous position of supervising the most spectacular scenery and the outstanding historic shrines of the country, of being besieged for information by many millions of people, and of being totally unable to meet the demand for such information through lack of adequate supplies of printed literature.

Last year more than 15,000,000 persons visited the various units of the Federal park system. Millions more—prospective visitors, students of secondary and high schools and colleges, study groups, and travel organizations—wrote to the National Park Service headquarters in Washington, the regional offices, the parks themselves, and the Travel Bureau in New York City, requesting printed literature.

Unfortunately, the bulk of these requests had to be denied. With approximately the same printing fund available as in 1932, but with nearly three times the number of areas to administer and with more than four times the number of annual visitors, increased printed costs made it possible to issue only 576,000 information circulars in 1938, as against 869,000 in 1932—and this despite the reduction in size of circulars. The raising of the ban on multilithing of informal leaflets through the Department's facilities gave a small degree of relief, but in no way solved the problem.

In line with the policies of foreign governments, which recognize in their travel trade a tremendous source of revenue, the National Park Service should be in a position to issue sufficient free printed informational circulars on the Federal park areas of the United States, and of booklets grouping these areas by travel regions, to meet the demands of all prospective and actual visitors.

Not only should larger quantities of information circulars be printed for the older areas, for which scant supplies now are issued, but provision should be made to print informational booklets concerning the many areas transferred to the jurisdiction of the National Park Service in 1933, and new areas created in recent years by Presidential proclamation or act of Congress.

In this connection, it must be emphasized that adequate supplies of printed information on the national parks and monuments are a prime requisite of the Travel Bureau of this Service, if that new unit is to function efficiently.

The increasing observance of Conservation Week throughout the country, especially in schools and by study-groups, has resulted in an increased need for printed park material; and supplying such literature should be a part of the Federal participation in every international exposition. In 1931, at the Overseas Colonial Exposition held at Paris, France, 100,000 copies of a national park booklet, prepared by the Service, were made available through the financial cooperation of the various transportation lines serving the parks. Efforts to secure Federal or private funds for similar purposes since that time have failed.

Printed literature is not the only printing need of the Service. Posters should be available, comparable to those issued by foreign governments to encourage tourist travel, for display and distribution not only in the regional offices, Travel Bureau offices, and other units of the National Park Service, but also through museums, educational institutions, travel organizations and industrial concerns, and at international expositions, in this country and abroad. The issuance of a few posters under an emergency fund several years ago met with widespread approval and use. Unfortunately, however, a demand was created which the Service no longer is able to meet, as emergency funds are not now available for this purpose.

Until provision is made for the printing of sufficient circulars and posters to meet the popular demand, a large amount of time must continue to be spent both in Washington and in the field answering the protests of disappointed applicants for circulars, of members of Congress whose constituents are unable to secure booklets, and of cooperating travel-encouraging organizations such as local chambers of commerce and automobile clubs.

RESEARCH AND EDUCATION

The wilderness areas of the national parks and monuments are among America's finest laboratories for the study of conservation.

Within the park system all forms of life are protected. The parks, therefore, are more than mere refuges for certain selected species. They are complete sanctuaries designed to perpetuate a complete fauna and flora and to furnish evidence of the orderly way in which nature maintains her domain. Species of animals and birds not found in abundance elsewhere are tame and viewable in the parks. Examples of earth-building forces are vividly present. More and more university scientists are finding these national areas, with their unspoiled, superlative lakes, forests, and mountains, to be the best possible places to which to take their classes for study. In them questions and answers and demonstration come together.

One of the most interesting educational features of the Service's year was its part in the Nation-wide celebration of the one-hundredth

anniversary of the birth of John Muir, great conservationist and "father" of many national parks. Special programs including lectures and pageants were given in the parks, and in the Washington office a John Muir study program was prepared, providing important and new material which stimulated commemorative ceremonies and additional study in many schools and women's clubs.

NEW KNOWLEDGE

Research studies carried on in the field by members of the National Park Service and by cooperating public and private institutions provided much new knowledge to be passed on to the visiting public. Natural history discoveries and investigations made during the year include:

Accumulation of data on many new species of birds, animals, and plants.

Collection of information on the interrelations of various organisms.

Cataloging of biological material, showing what each park affords.

Compilation of a mimeographed Check List of Birds of the National Parks, summarizing such information as now exists on the avifauna of 23 park areas in answer to a growing demand for information made by both administrators and visitors.

Collaboration with representatives of the Bureau of Biological Survey, Forest Service, Office of Indian Affairs and Coast Guard in the section on Wildlife Resources of the report *Alaska, Its Resources and Developments*, prepared under the direction of the National Resources Committee.

Continuation of range studies in Yellowstone, Zion, Hawaii, Wind Cave, and Rocky Mountain National Parks and at Lava Beds and Chaco Canyon National Monuments to determine the carrying capacities for big game and other species.

Continuation of investigations of bighorn at Rocky Mountain and Glacier National Parks, and conducting of field studies on mammals at Crater Lake National Park, Lava Beds, and Black Canyon of the Gunnison National Monuments, and in the proposed Big Bend National Park.

Collection of plant specimens and floral studies at Rocky Mountain, Mount Rainier, Great Smoky Mountains, Platt, Hawaii, Yosemite and Crater Lake National Parks, and Death Valley National Monument. Collection of botanical and ethnobotanical specimens at Hawaii National Park and at six southwestern monuments. Improvement in most parks in the status of scientific collections.

Initiation of a field study of evidence pointing to the origin of Crater Lake, financed by the Carnegie Institution of Washington and supervised by Dr. J. Howel Williams of the University of California.

Near completion of projects begun in Yosemite and Sequoia National Parks by Francois E. Matthes of the United States Geological Survey, including preparation of a series of illustrated albums with appropriate text to tell the geologic story of Sequoia and text for the key labels and statements designed to explain the geology of the Yosemite area to visitors.

Preparation of a text on the story of granite to be placed on top of Sentinel Dome in Yosemite National Park.

Inauguration of a study on the factors which control beach erosion and deposition of sand at Cape Hatteras National Seashore Project.

Completion of a year's field study of the coyote and its relationship to other wildlife species in Yellowstone and Grand Teton National Parks. As yet predation on game mammals and birds has not been severe and no emergency has been found to exist. There is evidence, from analysis of coyote food habits, of a favorable relationship of the coyote with other species. Study of economic food habits of the coyote in Lava Beds National Monument, in order to determine the effect of this species on the game-bird population of the adjacent Tule Lake Migratory Waterfowl Refuge, revealed that destruction of ducks and eggs by coyotes during the nesting season was of slight importance and did not warrant coyote control on the monument.

Continuation of studies of nesting Trumpeter Swans by park personnel at Yellowstone National Park. The 1937 census of this rare species revealed a total of 69 swans within the park. The number of cygnets was 50 percent greater than the number successfully reared in 1936.

Fish research study in several parks. Studies on ecological and historical factors involved in trout distribution in the Great Smoky Mountains National Park culminated in a paper by a wildlife technician published in the Journal of the Tennessee Academy of Science, in October 1937. A temporary ranger naturalist carried on studies of aquatic flora and fauna in Crater Lake, in connection with a survey of fish food and growth rates in trout.

Refinement of the geological map and preparation of a guide book of Mount Desert Island (Acadia National Park) based on field studies.

Discovery of fossils important to the interpretation of the geologic history of Great Smoky Mountains National Park in a limestone hitherto thought to be barren.

Discovery of new fossil plants in Petrified Forest National Monument.

Two discoveries of interesting prehistoric animals in Death Valley National Monument, one by the park naturalist and one by a representative of the Geological Survey. In addition to these discoveries, much progress was made in unraveling the geologic history of the monument.

A study of the origin of the gypsum at White Sands National Monument and preparation of an interpretative exhibit for the monument museum.

Continuation of research at Boulder Dam and installation of material previously collected in the museum space assigned in the new administration building.

Completion of an areal geologic map covering the proposed Big Bend National Park.

Establishment of a research plot at Shelby Forest, Tenn., for study of the cycle of erosion in loess deposits.

Cooperation of park naturalists in five national parks with the National Geophysical Committee in measuring the advance or retreat of the ice front of critical glaciers.

Earthquake studies by the park naturalist at Lassen Volcanic National Park in cooperation with the University of California. Continuation of volcanological studies in Hawaii National Park.

Revision of the technical circular, The Construction of Relief Models, so that it may be issued as a project training circular for the C. C. C.

Several natural history associations have aided the Service by publishing pamphlets and books containing information gained through research in the national parks. Mammals of Zion-Bryce and Cedar Breaks was issued by the Zion-Bryce Natural History Association in January; Birds of Rocky Mountain National Park by the park naturalist of that park was published by the Rocky Mountain Nature Association in March; and Check List of Birds of Grand Canyon National Park, by an assistant wildlife technician was issued in July 1937 by the Grand Canyon Natural History Association. In addition to these, the Government Printing Office published Fauna Series No. 3, Birds and Mammals of Mount McKinley National Park, by Joseph S. Dixon, Field Naturalist of the Service. About 20 other papers, covering distribution, food habits, and behavior of mammals and birds and management of mammals and fish in National and State parks, were published.

NATURALIST PROGRAM

The Service continued to expand its lecture, conducted trips and museum programs. Public interest is attested by the very large attendance records of the year, individual guided trips in some of the larger parks averaging from 50 to 125 persons per trip and some of the auto caravans including from 25 to 85 cars, making organization and instruction difficult for the limited staffs. Microphones were necessary at some campfire programs to enable large audiences to hear the speakers. Only increased man-power will make it possible to handle the public in smaller groups as should be done.

With a total staff of 125 naturalists, 33 of whom are on the permanent staff and 92 on the temporary ranger-naturalist staff, the Service contacted 4,500,000 visitors through lectures and guided trips during the year. Sixty percent of all visitors to parks maintaining such programs took part in the activities.

Recent surveys indicate that the public is most interested in trips and lectures designed to orient them with reference to the area they are visiting. Demands for trips of longer duration indicate a growing desire for more specific knowledge and a greater appreciation of park features. Wherever possible these longer trips have been added to the park programs, and several new amphitheaters have been constructed to facilitate campfire programs.

Two interesting new features are the rerouting of the famous Crater Lake boat trip to allow a naturalist to explain the scientific features in the walls of the crater as the boat passes, and the establishment of a Junior Nature School for Children in Rocky Mountain National Park. The school is designed for youngsters unable to take the more strenuous nature hikes. Numerous natural history subjects and the conservation of natural resources are taught.

A new type of self-guided trail known as the desert trail has been arranged at Casa Grande National Monument, so that interested visitors may see archeological and biological features not encountered on the regular guided trips.

During the past year successful experiments have been made in the use of natural color photography in the visual education programs sponsored by the Service.

TRAINING OF NATURALISTS

Improvement has been made in service through the selection of better trained and more mature men to serve as ranger-naturalists during the summer season.

The Yosemite School of Field Natural History, a graduate school with a college degree as entrance prerequisite, operated again the past season, training prospective national park personnel qualified for naturalist positions, both permanent and seasonal. The Secretary of the Interior has designated this school and the Yosemite Junior Nature School as nonprofit, scientific organizations engaged in a training enterprise helpful to the Service. The 1938 session, the fourteenth class of the school, began courses on June 20 with the selection of 20 students (14 men and 6 women) from more than 100 applicants.

Yale University continued its cooperation, assisting in National Park Service personnel training through awarding two graduate fellowships to Service employees. The fellowships are open to those interested in graduate studies bearing upon the educational or inter-

pretative program of the Service and may include wildlife, forestry, geology, biology, history, archeology, psychology, and education.

MUSEUMS

Continuing a policy of portraying certain phases of the American scene in a correlated story rather than by case after case of irrelevant objects, the Service's museum development program made great progress in 1937-38. Laboratories at Berkeley, Calif., Washington, D. C., and Fort Hunt, Va., assisted by P. W. A., E. R. A., and C. C. C. funds, are responsible for museum improvements in 37 national parks and monuments and in 5 State parks. In some instances, new exhibits have been prepared, in others old ones revised, and in many, new equipment and exhibit cases have been installed.

Fireproof housing for the priceless exhibits already accumulated in field museums is a primary objective in museum development.

Perhaps the foremost accomplishment in the museum field was the completion of the Department of the Interior Museum, which was opened to the public on March 9 and which portrays the history, organization, and functions of the various bureaus of the Department.

Noteworthy among the areas in the West which have been improved are Scotts Bluff National Monument, where the geology wing of the museum was completed for installation of a most interesting collection of extinct animal fossils found in the cliff on which the monument stands; Yosemite National Park, where exhibits for the Indian and geology rooms of the museum were revised and many physical improvements made including better housing for research collections; Crater Lake National Park, where the Sinnott Memorial was made waterproof and exhibits revised; and Tumacacori National Monument, where a new museum was opened to the public with exhibits telling the story of the coming of the Spanish to this region and the incidents connected with the mission. Lack of funds prohibited the completion of the museum at Morristown National Historical Park, although the history room has been opened to the public.

Dioramas, photographs, paintings, and models were sent out for display at 15 expositions, a large quantity of material having been sent to Stockholm, Sweden, for the Swedish-American exhibit at A. B. Nordiska Kompaniet.

High recognition of the value of the museum work the National Park Service is doing was received in the award of Rockefeller fellowships to two of the personnel for study with the Buffalo Museum of Science.

WILDLIFE MANAGEMENT

Studies have been made in an effort to solve the troublesome problems of deer and bear management in certain parks, and fish-cultural activities have been improved through cooperative projects.

Management of deer has received attention in parks where the feeding of animals by tourists has tended to pauperize them and in those parks where abnormal and unnatural concentrations of animals have resulted in serious reduction of natural food supply. The problem has been attacked at Yosemite and Sequoia through discouragement of feeding and by moving deer to other portions of the respective parks. Plans have been drafted for use of the same methods at Zion with possible additional control by hunting outside the park.

Improvements have been made in bear management in the larger parks where serious problems have resulted from too close contact between bears and the public. Bear shows in Yellowstone, Yosemite, and Sequoia National Parks have been modified toward a less artificial presentation. An educational campaign has been initiated to inform the public that bears should be let alone to prevent possibility of human injury. As nearly all injuries inflicted by bears are directly or indirectly due to human interference, a new Service regulation, approved by the Secretary, prohibits all feeding of bears by the public and should aid in reducing injury hazard to a minimum.

In the past year, fish-cultural activities in the national parks have shown notable improvement. Through the cooperation of the Service with the Bureau of Fisheries and State game departments, 22,330,000 fish, principally trout, were planted in the waters of various national parks and monuments. This is an all-time record for fish planted in Federal park areas. Almost 41,000,000 black-spotted and rainbow trout and grayling eggs were obtained last year from Yellowstone Park waters—another record.

There is evidence of improved fishing conditions in many park waters. As the continued increase in park travel has resulted in the heavy utilization of fish resources, there is an increasing need for an enlarged planting program. This need will be met in Glacier National Park through the operation of the Jessup Mill Fish Hatchery, soon to be constructed, and in Yosemite by a new spawn-taking development at Lake Eleanor.

An agreement among the National Park Service, the Bureau of Fisheries, Bureau of Biological Survey, Game Commissions of Nevada and Arizona, and interested sportsmen's organizations has been reached, placing the control of fish planting in Lake Mead and other waters of the Boulder Dam National Recreational Area in the hands of the National Park Service, with cooperation from the other agencies.

Elk reduction was carried on in Yellowstone National Park and vicinity in the winter of 1937-38, as in the past 3 years, in an effort to limit the herd to the carrying capacity of the winter range. After the herd reduction, a census showed 10,976 animals still on the northern Yellowstone range.

PRESERVATION OF HISTORIC SITES AND BUILDINGS

Just as the scenic areas provide unparalleled laboratories for the study of natural sciences, so the historic and archeologic areas of the National Park Service are ideal classrooms for students of American history and prehistory.

Research and investigation designed to add new knowledge to its records and actual working information for restorations and repairs are among the principal duties of the staff. Important projects of the year included:

Completion of a comprehensive study of the history of Fort Pulaski.

Near completion of a detailed study of the military operations culminating in the Battle of the Wilderness.

Completion of research study of the Oglethorpe Trail from Savannah to Augusta, Ga.

Compilation of a record of photographs taken by M. B. Brady during the War Between the States, a record expected to be extremely valuable in the development and interpretation of military areas of that period.

Copying of important manuscripts, including records of La Purisima Mission, which is being restored by the State of California with the assistance of the Service, and an extensive collection of Revolutionary manuscripts at Morristown National Historical Park. The microcopying and projection equipment purchased last year was used for this.

Formulation of a statement of the major objectives to be incorporated in the planning and building of the Jefferson National Expansion Memorial in St. Louis, Mo. The staff was assisted by the Advisory Board on National Parks, Historic Sites, Buildings, and Monuments and the statement has been approved by the Secretary of the Interior. Extensive research is now being undertaken to determine the form of memorial best suited to portray events in and the far-reaching results of our national expansion. On January 10 the Secretary approved the expenditure of \$100,000 from funds allotted to the Jefferson National Expansion Memorial for the preparation of illustrative material concerning the project.

Preparation for inaugurating historical studies of the Chesapeake and Ohio Canal, interesting old waterway from Georgetown, D. C., to Cumberland, Md., as plans for its development are formulated. The canal had close historical association with early movements sponsored by George Washington to open communications between the frontier and tidewater sections, and with the destinies of cities along the Potomac.

Completion of the extensive and long-awaited Schneider report. In the fall of 1934, Mr. J. Thomas Schneider began, at the request of the Secretary of the Interior, a comprehensive study from funds furnished

by the Rockefeller foundation, international in scope, entitled "Report on the Preservation of Historic Sites and Buildings." During the past year the Advisory Board approved its publication and copies will soon be available for distribution to Federal and State agencies interested in historical and archeological conservation. Part I reviews Federal, State, local and private progress in this field in the United States; part II discusses the legislative history and administrative organization for the preservation of historic sites and buildings in Great Britain, France, Germany, Italy, Sweden, and other foreign countries; part III is a detailed analysis of the Historic Sites legislation enacted August 21, 1935, setting forth conclusions and recommendations for effectuating the broad national policy of historical and archeological conservation embodied in the legislation.

Accumulation of valuable data relating to the history of Fort Laramie, Wyo., to the Derby Wharf area of Salem, Mass., and to Ackia Battleground, Miss., in preparation for future development programs of these three areas.

Collection of information needed for base sheets in master plans showing physical aspects and historic points at the time of the greatest historic significance of an area.

Other major studies in progress, some completed, during the year, were concerned with the Battle of Manassas, Va.; the Vicksburg Campaign, Miss.; the George Washington Birthplace National Monument, Va.; Goliad Mission, Tex.; the route of the Death Valley pioneers, 1849-1850; Mackinac Island State Park, Mich.; Civil War guns and gun carriages; and eighteenth century Spanish ordnance.

During the past year, the desirability of increasing close cooperative relations with learned institutions in the fields of history, archeology, and architecture has become more than ever apparent as essential in research and scientific survey designed properly to evaluate historic sites. Accordingly, the National Park Service enlisted and secured the cooperation of the following scientific institutions preeminent in the fields of study with which the Service's historical program is most directly concerned:

The National Archives and the Library of Congress in the field of history;

The Smithsonian Institution in the field of archeology;

The American Association of Museums in the museum field.

With the guidance of these institutions and the Advisory Board, considerable progress has been made in a Nation-wide survey of historic sites. A total of 620 sites have been inventoried; 200 proposed areas have been investigated; and 600 sites have been classified as eligible for further study under the 15 broad themes believed to be the most important and far-reaching phases in the social, economic, cultural, and political development of the American people. During

the past 6 months special studies have been made of sites classified under Theme One, Spanish Exploration and Settlement, with particular reference to the sixteenth century.

In actual preservation activities, the Service has greatly extended the program for the development of Ocmulgee National Monument with a view toward eventual centralization of southeastern archeological studies at Macon, Ga. It is contemplating the construction of a museum there to serve as a center of research activity.

Through its general program of State cooperation, the Service has contributed to the preservation of many sites on areas of primary historical or archeological interest throughout the country. Among the more important are:

Fort Clinch State Park, Fla.; Fort Morgan State Park, Ala.; Columbus-Belmont State Park, Ky.; Longfellow-Evangeline State Park, La.; Fort Frederick State Park, Md.; Illinois-Michigan Canal, New Salem, Lincoln Log Cabin and Pere Marquette State Parks in Illinois; Spring Mill State Park, Ind.; Mackinac Island State Park, Mich.; Fort Ridgely State Park, Minn.; Fort Lincoln State Park, N. Dak.; Fort Sisseton and Custer State Parks, S. Dak.; Fort Parker and Big Bend State Parks, Tex.; Fort Lowell State Park, Ariz.; Fort Churchill State Park, Nev.; and La Purisima State Park, Calif.

The Service also continued to review projects covering restoration of sites and structures under the W. P. A. and extended this cooperation to other departments which supervise C. C. C. projects of the same character.

ADVISORY AND TRUST FUND BOARDS

The Advisory Board on National Parks, Historic Sites, Buildings, and Monuments suffered a grievous loss by the death of Mr. Archibald M. McCrea.

The National Park Service Trust Fund Board accepted donations of \$3,000 from Metro-Goldwyn-Mayer and \$1,000 from Twentieth Century Fox moving picture corporations which took motion pictures in Zion and Mount Rainier National Parks. These contributions brought the donations credited to the national park trust fund account to a total of \$12,000. No expenditures were made from the fund during the year.

FOREST PROTECTION AND FIRE PREVENTION

Not only are trees an essential element in nearly every park of major scenic importance, but in themselves the magnificent virgin forest stands are an irreplaceable asset—sometimes the principal reason for park creation.

Protection of the park forests, therefore, is a vital part of park administration, and one to which increasing attention is being devoted.

Fire, the most serious enemy of the forest, is a two-headed foe. Sometimes it strikes through lightning, but more often it is man-caused. During the past year the Service was fortunate in having no serious forest fires. The 1937 fire record, as shown on pages 42-45, is indeed gratifying, especially when taken in conjunction with the fact that of the approximately 19 million acres of land in the Federal park system, more than 8 million acres require fire protection.

For the western parks the number of man-caused fires was the lowest since 1930. Gratifying as this record is, the field personnel is faced with a difficult task in combating the carelessness of visitors when handling fire in the out-of-doors, for 67 percent of all the park fires in 1937 were man-caused. A concerted effort was made to cut down the number of man-caused fires by reduction of fire hazards and through public contact and educational efforts.

It was possible to give more intensive training in fire protection to park rangers, fire guards, and C. C. C. supervisory personnel and enrollees than in the past. Participation by park protection personnel in fire prevention training given by cooperating protection agencies was also authorized by Congress.

The program for taking panoramic photographs from fire lookouts and observation stations, as a means of improving fire detection and fire dispatching within the national park system, was completed. This program, initiated 4 years ago, envisioned the preparation of panoramic photographs from all existing, proposed, and emergency lookout points in all the national parks and monuments. Copies of these panoramic photographs have now been placed in the hands of the proper fire protection personnel throughout the entire Service and cooperating agencies. Additional work will of necessity be done in the future in new areas or where a review of present detection facilities indicates a need for restudy through the means of such photographs.

During the past year five 1½-ton fire trucks equipped with water tanks and pumpers were distributed to Acadia, Great Smoky Mountains, Mammoth Cave, Crater Lake, and Hot Springs National Parks as welcome additions to the fire suppression equipment. Within the limited available appropriations every effort is being made to place adequate mobile fire apparatus in those areas where fire studies indicate a need.

Insect control.—Extensive surveys of forest insect conditions in the western national parks and monuments indicated an improvement over the preceding year as a result of the control program under way for a number of years. The epidemic of the Black Hills and Douglas fir beetle in Bryce Canyon National Park made it necessary to con-

tinue control work, but on a greatly reduced scale, this year. A serious epidemic of the Black Hills beetle in and adjacent to Rocky Mountain National Park was controlled by joint action with other Federal agencies. In cooperation with the Forest Service and W. P. A. control operations for the Black Hills beetle on 70,000 acres of forest in and around the Denver Mountain Parks were initiated during the year. Serious mountain pine beetle and Engelmann spruce beetle infestations exist in Yellowstone National Park, and the lodgepole needle miner still continues to menace the lodgepole pine stands in Yosemite National Park.

In the eastern national parks and monuments insect conditions were for the most part endemic during the year. Shenandoah reported an unusual outbreak of the walking stick, on which very close observations will be maintained. Control operations against the Japanese beetle at George Washington Birthplace National Monument were initiated last summer by spraying 12 acres of ground with lead arsenate. The beech scale insect infestation was found to be epidemic in Acadia National Park and all beech trees were sprayed with lime sulphur.

Blister rust control.—The white pine blister rust disease, which has been moving from the Pacific Northwest southward into California, became so menacing during the year to the five-needle pines in Lassen Volcanic, Yosemite, General Grant, and Sequoia National Parks that plans were made to initiate control operations this summer. Eradication of *Ribes* (currants and gooseberries), the alternate host of the white pine blister rust, was started in Yosemite National Park in June, and similar work will be initiated soon in the other three parks. This threat to the white pines of California, including the sugar pine, the western white pine, and at the high elevations the white-bark and the foxtail pines, must be controlled if these species are to be conserved for posterity in the national parks of California. Prompt and efficient control of the disease is without doubt one of the most important conservation measures demanding the attention of this Service at this time.

Blister rust control projects were continued in Mount Rainier, Crater Lake, Acadia, and Shenandoah National Parks. Blister rust reconnaissance surveys were started in Yellowstone National Park, since the disease is known to be within a few miles northwest of the park.

Tree preservation and repair.—The C. C. C. itinerant tree preservation crew, which for 2½ years has provided the care necessary for the preservation and repair of important trees in the national cemeteries, national battlefield sites, national historical parks, and national military parks, was discontinued because of diminishing C. C. C. appropriations.

Type mapping.—The type mapping program for the purpose of obtaining a detailed inventory and map of the vegetative cover of the parks for use in planning protection, development, and use of the areas was materially curtailed during the year. This work is now very largely completed. The few exceptions are Acadia National Park and the more recent extensions to existing areas. Approximately 6,913,000 acres have been mapped to date, and copies of the maps and of the inventories are being placed in the hands of the park superintendents for their use in protection and administration. Much additional information has been provided by this work relating to the flora of the parks, and a project is under way to assemble in printed form a check list of the flora of the western national parks and monuments.

Forest nurseries and planting.—Forest nurseries are operated in Sequoia, Yellowstone, Great Smoky Mountains, Shenandoah, and Platt National Parks for the purpose of raising planting stock for reforestation of burns where natural reproduction is lacking, for landscape planting, for planting for erosion control, and for replacements of dying trees in and adjacent to public campgrounds and other developed areas.

Over 3 million seedlings obtained from the Soil Conservation Service were planted in recreational demonstration areas for the purpose of assisting in erosion control or to reforest cut-over or burned-over lands.

Emergency appropriations make forest protection possible.—As in the 3 preceding fiscal years, all forest protection improvements, insect and tree disease control, type mapping, and tree preservation activities were financed from the emergency appropriation. The meager allotment for forest protection and fire prevention for the fiscal year 1938 under the regular appropriation provided funds only for the most essential needs for fire protection personnel and equipment which could not be supplied under the C. C. C. program. The above forest protection accomplishments therefore are largely represented in the report of the C. C. C. program.

PLANNING AND CONSTRUCTION

The ever increasing number of visitors to national park areas is making necessary the application of all the ability of the landscape architect, the architect, and the engineer to retain the primitive qualities of those areas while permitting intensive human use.

Apart from major road construction, approximately 600 job plans involving new areas, new buildings, and practically all types of park construction were studied.

A new edition of the comprehensive master plan for each national park area has been prepared to enable the National Park Service to

program efficiently the necessary future development with as little violation of natural beauty and qualities as possible. In addition, some 6,000 job plans for similar work in State park, recreational demonstration project, and work camp areas were reviewed, and technical engineering and landscape advice and assistance rendered to the State park authorities, especially on jobs involving major and difficult design. Appropriations were considerably less than in recent years with consequent postponement of development of some individual areas.

A long-awaited building project in Alaska, the hotel at McKinley Park Station and auxiliary buildings was started and practically completed through a P. W. A. allocation of \$350,000. Although the hotel will be operated by the Alaska Railroad, planning and supervision of construction were handled by the National Park Service. An attractive structure was erected at Tumacacori National Monument to serve museum and administrative purposes adjoining the ruins of the interesting Spanish mission. Other P. W. A. funds provided for the restoration of historic buildings and wharf at the Salem Maritime National Historic Site and for the preparation of plans for a fish hatchery group to serve Glacier National Park. Public Works funds were combined with C. C. C. labor for the reconstruction of a lodge at Petrified Forest National Monument, which is rapidly nearing completion. The C. C. C. made an important building contribution with the completion of the cave elevator building at Wind Cave National Park. A large and attractive development for the regional office at Sante Fe, N. Mex., is being built by the C. C. C. and E. R. A.

The Statue of Liberty National Monument will be beautified and its facilities greatly improved through the allotment of E. R. A. funds for planning and redevelopment. Visitors to the New York Worlds Fair in 1939 will find that famous area more attractive and better able to care for them than ever before.

Through its engineering staff the Service coordinated with other bureaus matters pertaining to technical collaboration in connection with water utilization or control projects, both authorized and projected, where those projects may have some effect on an existing or proposed national park area.

Through the loan of its personnel and facilities, the Service cooperated with other agencies as consultant, particularly in connection with dam design and the soil mechanics work of the engineering laboratory.

One of the more important accomplishments of the year was the completion of a comprehensive road-maintenance study and report covering all Service areas with a tabulation of all roads as to class, type of construction, and maintenance estimates, including maintenance equipment inventory and needed equipment to carry on the

recommended maintenance program. This is the first complete composite record of all roads in the park system, and a step toward more adequate maintenance and centralized control. As in the past, the Bureau of Public Roads of the Department of Agriculture continued major road building for the Service.

Under the roads and trails appropriation of \$4,500,000 for the 1938 fiscal year a number of the larger road systems were improved, and the first major road in the new Boulder Dam area was started. Construction was begun on the Fresno-General Grant approach road and on the Zion-Bryce Canyon approach road.

PARKWAY DEVELOPMENT

The Blue Ridge and Natchez Trace Parkway projects, pioneers in their respective fields of national recreational and historical motor travel, continued to develop under regular Federal appropriations.

The Blue Ridge project, with 115 miles graded and 50 miles additional under grading contract, is rapidly approaching a useful stage as far as the Roanoke-Asheville unit is concerned. Development of recreational parks adjacent to the parkway continued, as well as construction of bridges and overpasses.

On the Natchez Trace project, grading continued on three sections, totaling 34 miles in Mississippi. Survey and location work was carried on in Mississippi, Alabama, and Tennessee, in collaboration with the Bureau of Public Roads.

The city of Washington saw another step forward in the extension of the George Washington Memorial Parkway when work on the Columbia Island development was placed under contract.

HISTORIC AMERICAN BUILDINGS SURVEY

Continuing its program of making a permanent graphic record of all important existing monuments of the builders' art erected in the United States and possessions before the last quarter of the nineteenth century, the survey of historic American buildings entered its fifth year of continuous field work. Under the supervision of the National Park Service a number of State W. P. A. projects and several university collaborative programs were organized or continued, adding more than 2,000 measured drawings and 1,800 architectural photographs to the growing collection in the Fine Arts Division of the Library of Congress. The master index of early American buildings being made by the Survey was considerably advanced during the year and now contains information on more than 7,000 structures. All records deposited have been made available for public use and reproduction.

Advancing the program of a national plan sponsored by the Department of the Interior, through a three-party agreement between

the National Park Service, the Library of Congress, and the American Institute of Architects, the Survey continued to function in the conservational capacity of recording first those historic structures in danger of destruction in the States where work relief projects for this purpose could be organized.

SAFEGUARDING THE PUBLIC HEALTH

Working closely with the engineers of the National Park Service, sanitary engineers of the Public Health Service of the Treasury Department have assisted in protecting the health of the 15,000,000 park and monument visitors and that of the approximately 13,000 persons employed during the year by the National Park Service and of the thousands more working for the operators of concessions in the park supplying accommodations to visitors.

As always, great attention was given to providing adequate supplies of pure water and to the proper disposal of sewage.

Notable among the accomplishments in this field were the handling of the sanitation problem arising at the Gettysburg National Military Park during the commemoration of the seventy-fifth anniversary of the Battle of Gettysburg, and the installation of a new sewage treatment plant at Mammoth Cave National Park.

Among the interesting plans submitted were those for sewage treatment plants at Mount McKinley National Park and for a general sewage disposal layout at the North Rim, Grand Canyon National Park.

A special investigation was made of the distribution and use of the reclaimed sewage water at the South Rim of the Grand Canyon, with particular reference to safeguards adopted. Bacteriological analyses of samples of reclaimed sewage-water at the South Rim used for industrial purposes indicate that this water meets the Treasury standards for drinking water. It is, however, never used for domestic purposes.

The water supply problem at Colonial National Historical Park continues to be urgent, through lack of funds to handle the situation adequately.

ACCOMMODATIONS FURNISHED BY CONCESSIONAIRES

The long-established policy of granting concessions for the operation of accommodations for the public in the Federal park areas was continued. Additional study was given to the plan of housing some of the smaller concession operations in Government-owned buildings.

The upward trend of the past three seasons was somewhat checked, the 1938 revenue being slightly less, in most instances, than that for 1937. This was largely the effect of a lessening of business from organized rail tours.

Studies of the concession service of the past year compared with that of 10 years ago show an interesting trend. Before the 1929 depression, substantially all profits of the park operators were earned from furnishing sightseeing transportation and first-class American plan hotel accommodations. Revenue from other sources was immaterial, there being practically no cafeteria, coffee shop, or grill services.

Today the profit-producing facilities are the low-priced cabin accommodations, cafeteria, coffee shop, and grill services. Although the transportation and first-class hotel accommodations still furnish the greater portion of the operators' revenues, they are less self-supporting than the newer types of accommodation.

Under present policies, such items as gasoline and food supplies are sold at the same rate as in the nearest city to the park. Wherever the volume of business made possible a reasonable profit, the same ruling has been applied to purchases at soda fountains and light lunch counters.

Although no unusual or especially large projects were undertaken by the park operators, continued general improvements were under way in all of the parks.

The Virginia Skyline Co., Inc., completed and put into operation the first section of a large cabin development at Big Meadows and opened a new roadside facility for meals and lodging at Dickey Ridge, in the Shenandoah National Park. A lunchroom and gasoline station also were opened at Elk Wallow.

The demands for additional housing accommodations at Mammoth Cave National Park were so insistent that construction of 35 additional cabins is under way.

The development by the Federal Government of the landing field at the Boulder Dam recreational area was completed. Arrangements were made by the park operator for the landing thereon of the cross-country planes of Transcontinental Western Air Lines.

Construction was started on the development, on an experimental basis, of a facility to provide inexpensive overnight accommodations in Sequoia National Park for groups of young people.

An interesting experiment in low-cost housing is under way in Yosemite National Park, where the park operating company (whose president is a member of the National Park Service Committee on Auto Camps and Housekeeping Cabins) is erecting a few cabins each of several types of minimum cost prefabricated housing units. If satisfactory, this development should enable the park operators to provide cabins at a moderate investment and with resultant low charges and a fair rate of return earned.

Cooperation was continued with the Indian Arts and Crafts Board in the promotion of the sale of Indian handicraft in the western

national parks and with the Southern Highland Handicraft Guild in the sale of mountaineer products in the eastern national parks.

Short-term contracts were entered into for the furnishing of limited transportation and saddle-horse services in Death Valley National Monument.

Several of the park operators, with the approval of the Department, made application to the Reconstruction Finance Corporation for loans for the construction of additional facilities. The Mesa Verde Park Co. was successful in securing a loan, and the applications of other park operators are still under consideration.

As of June 30, 1938, there were 140 corporations, firms, or individuals in 49 national parks, national monuments, and other areas under the jurisdiction of the National Park Service operating under contract or permit to furnish accommodations to the public as compared with 131 such concerns as of the beginning of the fiscal year and 89 such concerns as of 10 years before.

Field studies of electric, telephone, water, and sanitation services furnished to the park operators were made at Lassen Volcanic, Mesa Verde, and Shenandoah National Parks and the Oregon Caves National Monument. Rates to be charged for these services will result in new or increased revenue to the United States of approximately \$3,600. These services are furnished to the park operators at a cost which includes depreciation, maintenance, and operating charges.

Field inspections were made of both the park operators' and the Service's buildings in the larger parks. As a result, the following improvements have been made or are in process: the relocation of large gas meters in the natural gas lines serving buildings at Hot Springs National Park; safeguards for oil tanks at Yellowstone National Park; and structural changes for the control of fire in the hotels at Glacier National Park.

Employee safety activities included the preparation and distribution of posters, the establishment of a park safety program which provides a systematic procedure for the reduction of accidents and for the investigation of serious accidents. Progress has been made in the preparation of standards for safe practice to be followed by the Service in construction projects.

NATIONAL CAPITAL PARKS

During the fiscal year 1938 numerous projects of great significance in the development of the ultimate plan for the park system were undertaken, and many events of national importance and interest were held in the National Capital Parks.

Rawlins Square, one of the important small parks of the northwest rectangle, redesigned along strictly formal lines, was completed under P. W. A. authorization.

Important progress was achieved on the roads and trails project for the extension of the George Washington Memorial Parkway, Memorial Avenue to Key Bridge, including the construction of the permanent bridge across Boundary Channel, the temporary bridge over Little River, and the Lee Boulevard connection. Completion of the rough grade over the entire area, with the exception of a small section on Columbia Island, was recorded.

The W. P. A. project for the demolition of the old Brightwood Reservoir and the conversion of the adjacent area in Rock Creek Park into a major recreation center achieved important progress.

The road in the south grounds of the Executive Mansion was re-routed and reconstructed and the low iron fence enclosing the south grounds of the White House was replaced by a higher fence of copper-bearing steel, designed to harmonize with the colonial iron fence enclosing the north grounds.

A permanent flood-control dike north of the Lincoln Memorial Reflecting Pool and in the Washington Monument grounds was constructed by the United States Engineer Office.

Work on the construction of a new modern four-lane steel and concrete single arch bridge to replace the old two-lane bridge over Rock Creek Park in section 4, Rock Creek and Potomac Parkway, advanced beyond the 50-percent completed stage. The equitation field in Rock Creek Park was redesigned, completely regraded, and equipped with new jumps. A bridle path underpass at the Tilden Street Bridge was constructed to abolish the traffic hazard which existed previously at that point. This project also involved the construction of minor bridges over the adjacent mill race.

Events.—An event of principal importance during the year was the National Boy Scout Jamboree, attended by more than 30,000 Scouts from each State of the Union and several foreign countries. The Scouts were encamped in East and West Potomac Parks and the Washington Monument grounds and along the Mount Vernon Memorial Highway. Other events held in the park system during the year included the inauguration of the National Celebration of the Sesquicentennial of the Constitution, with President Roosevelt as principal speaker; the encampment of the Workers Alliance in West Potomac Park during August; the Japanese Cherry Blossom Festival; the President's Cup Regatta; and the National Conservation Rally of the Campfire Girls.

Administration.—During the year 1938 the total appropriations accounted for by National Capital Parks amounted to \$2,555,456.72. In addition, the following four C. C. C. camps were maintained:

NP-6—Fort Hunt, Mount Vernon Memorial Highway.

NP-7—Fort Dupont.

NP-8—Theodore Roosevelt Memorial Island.

SP-6—Garrett Park, beginning April 15, 1938.

Attendance.—The total attendance in the National Capital Parks during the fiscal year was estimated to be approximately 50 million.

CHANGES IN FEDERAL PARK SYSTEM

Establishment of new areas, boundary revisions, and changes in status of existing areas marked continued growth and development of the Federal park system during the 1938 fiscal year. The system now comprises 27 national parks, 73 national monuments, 11 national military parks, 11 national cemeteries, 8 national battlefield sites, 8 national memorials, 1 national recreational area, 1 national historic site, 1 national parkway, 3 national parkway projects, 2 national historical parks, and the National Capital Parks unit, totaling 19,187,933 acres.

OLYMPIC NATIONAL PARK ESTABLISHED

An act passed in the closing hours of the Seventy-fifth Congress gave the Nation the new Olympic National Park of approximately 624,000 acres, including the former Mount Olympus National Monument, Wash. The President's approval of this measure (H. R. 10024 as amended) on June 29, 1938, fulfilled a 34-year dream of conservationists. The measure authorizes the President to add to the park a maximum of 262,292 acres so that the final boundaries may include a total of 898,292 acres.

NEW NATIONAL MONUMENTS

Three new national monuments were added to the system: Capitol Reef National Monument, Utah, established August 2, 1937, by Presidential proclamation; Pipestone National Monument, Minn., established by act of Congress, August 25, 1937 (50 Stat. 804); and Channel Islands National Monument, Calif., established by Presidential proclamation April 26, 1938.

EXTENSION OF NATIONAL PARKS

Congress, by an act of June 20, 1938, extended the boundaries of Hawaii National Park to include, in the Kilauea-Mauna Loa section, an area to the southeast containing a shoreline and one of the few remaining unspoiled native villages on the archipelago.

The boundaries of Hot Springs National Park, Ark., were extended by an act of Congress approved June 23, 1938, making possible acquisition of land to protect the watershed for the probable source of the hot springs from the denudation regarded as inevitable if the West Mountain-Sugar Loaf Mountain extension remains in private hands.

FIRST HISTORIC SITE ESTABLISHED

Salem Maritime National Historic Site, Mass., established March 18, 1938, by designation by the Secretary of the Interior, is the first area of its type established under the important and far-reaching national policy for historic preservation embodied in an act of August 21, 1935 (49 Stat. 666).

LANDS ADDED TO EXISTING FEDERAL PARK AREAS

Net increase to the Federal park and monument system through adjustment of boundaries of existing areas and lands acquired for authorized areas amounted to 1,846,377.363 acres, as follows:

Acadia National Park.—Donations of 706.137 acres increased the total area of the park to 16,646.227 acres.

Black Canyon of the Gunnison National Monument.—By proclamation of May 16, 1938, 100 acres were added to the monument, making a total of 11,197.76 acres.

Blue Ridge Parkway.—Donations of 1,469.69 acres of land, all in the State of North Carolina, and an accurate compilation of the area heretofore acquired resulted in a total area of 4,972.28 acres for this parkway.

Boulder Dam National Recreational Area.—By agreement with the Bureau of Reclamation, approved by the Secretary of the Interior, the National Park Service is charged with the development and supervision of the recreational facilities of this area containing approximately 1,699,573 acres.

Cape Hatteras National Seashore Project.—The War Department transferred 74 acres for this project.

Chickamauga and Chattanooga National Military Park.—Donation of 0.082 acre brought the total of this park to 8,629.212 acres.

Chiricahua National Monument.—By proclamation of June 10, 1938, 6,407 acres were added to the monument, making a total of 10,694.8 acres.

Colonial National Historical Park.—Acquisition of 23.805 acres through donation and purchase resulted in a total of 6,325.765 acres for this national historical park.

Fort Donelson National Military Park.—Transfer of 9.18 acres from the War Department brought the total area to 102.54 acres.

Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park.—Donation of 42.811 acres resulted in a total area of 2,328.091 acres.

Great Smoky Mountains National Park.—Acquisition of 25,913.85 acres through donation and purchase brought the total area to 437,602.65 acres; 26,064 acres still to be acquired.

Hot Springs National Park.—Purchase of 5.815 acres increased the total area to 989.805 acres.

Isle Royale National Park project.—The purchase and donation of 73,605.04 acres brought the total Federally owned area to 112,681.59 acres, 20,723 acres still to be acquired.

Kennesaw Mountain National Battlefield Site.—The acquisition of 477.93 acres brought the total area to 648.03 acres.

Mammoth Cave National Park.—Acquisition of 3,984.85 acres through donation and purchase resulted in a total park area of 38,545.164 acres; 6,764.836 acres still to be acquired.

Petersburg National Military Park.—Purchase and donation of 88.734 acres increased the total area to 1,938.834 acres.

Region III.—Acquisition of 8.04 acres as donation for headquarters site.

Salem Maritime National Historic Site.—Donation of 8.289 acres increased the total area to 8.609 acres.

Statue of Liberty National Monument.—Transfer of 7.88 acres from the War Department increased the total area to 10.38 acres.

Vicksburg National Cemetery.—Acquisition of 80.03 acres by purchase resulted in a total area of 118.190 acres.

Wupatki National Monument.—By proclamation of July 9, 1937, 33,631.20 acres were added to the monument, making a total of 35,865.30 acres.

Yosemite National Park.—Acquisition of 160 acres by purchase increased the total area to 752,904.32 acres.

LEWIS AND CLARK CAVERNS NATIONAL MONUMENT ABOLISHED

Pursuant to an act of August 24, 1937 (50 Stat. 746), the Secretary issued Patent No. 1096218, dated March 16, 1938, to the State of Montana, embracing 1,438.36 acres. This patent includes the 160 acres of land formerly within Lewis and Clark Caverns National Monument, now abolished.

PROPOSED EXTENSIONS OF EXISTING FEDERAL PARK AREAS

By resolution of June 7, 1938, the Senate authorized the Committee on Public Lands and Surveys to investigate, in the summer of 1938, the necessity, suitability, and feasibility of extending the boundaries of Grand Teton National Park, Wyo., to include the Jackson Hole country and an area within Teton National Forest which surrounds Jackson Lake. This will be the second Senate investigation of the project.

Senate resolution agreed to on June 7 authorized and directed the Committee on Public Lands and Surveys of the Senate to conduct a thorough investigation of all questions relating to the suitability and feasibility of creating the Petrified Forest National Park of the area now set apart as Petrified Forest National Monument in Arizona. The investigation is to be conducted during July and August.

The Service has undertaken the acquisition, largely by condemnation, of 7,730 acres of sugar-pine forest for inclusion in Yosemite National Park, Calif., for which money was appropriated in June 1937.

STATUS OF FEDERAL PARK PROJECTS AUTHORIZED BY CONGRESS

Through allocation of \$705,000 of Federal emergency funds and appropriation of \$100,000 by the State of Michigan, 102,567 acres have been purchased for the Isle Royale National Park project at a cost of \$522,481. The remaining funds make possible acquisition of 7,974 acres now under contract for \$150,098 and 10,098 acres in course of condemnation. The act of June 20, 1938, authorizes the addition to the park of lands acquired with emergency funds.

The boundaries of the Everglades National Park project were fixed by the Secretary of the Interior to include a small portion of Key

Largo and a portion of Florida Bay. The project involves more than a million acres, of which 759,520 acres are State-owned and the remainder privately owned. The State of Florida is conducting a campaign to raise funds for purchase of the private lands for donation to the Federal Government.

A civic campaign is under way in Texas to raise funds for the purchase of land necessary for establishment of Big Bend National Park, authorized by Congress by act of June 20, 1935.

An act of August 17, 1937 authorized the establishment of Cape Hatteras National Seashore when title to certain lands on the North Carolina coast within an area of approximately 100 square miles becomes vested in the United States. The Department has designated the boundaries, and the State has undertaken through its department of conservation and development to acquire privately owned lands for transfer to the Federal Government.

Establishment of Saratoga National Historical Park, N. Y., when lands necessary therefor are acquired by donation or with donated funds, is authorized in an act of June 1, 1938. The park would include that part of the Saratoga Battlefield now owned by the State of New York and any additional lands which the Secretary of the Interior may, within 6 months after approval of the act, designate as necessary or desirable.

A joint resolution, approved June 15, 1938, authorized the Secretary of War to transfer to the Department of the Interior the Cape Henry Memorial site in Fort Story Military Reservation, Cape Henry, Va., which commemorates the first landing on American soil, April 26, 1607, of the colonists who established the first permanent English settlement at Jamestown. A formal request for the transfer is being made to the Secretary of War. If the transfer is made the site will be administered as part of Colonial National Historical Park.

The act of June 28, 1938 rerouted the Williamsburg-Jamestown section of the Colonial parkway described in Presidential proclamation of August 22, 1933 (48 Stat. 1708) in a more logical course to connect Governor Markeley's Green Springs Mansion, Carter's Grove Mansion, and the Roswell Mansion, which are proposed for addition to the park. The exact location of the new route extending south from the City of Williamsburg to the James River and along the river and connecting waters to Jamestown Island, will be determined by the Secretary of the Interior. The act also authorizes the Secretary to acquire by donation, purchase, or otherwise, for addition to the park, the Glass House Point area, The Hook, and an enlarged Gloucester Point area.

The Service is acquiring by condemnation 49.15 acres for Ackia Battleground National Monument, Miss., authorized by an act of August 27, 1935 (49 Stat. 897).

It is expected that the establishment of Badlands National Monument, S. Dak., authorized in 1929, will be consummated soon. Only the exchange of State lands within the project for Federal lands outside the area delays establishment.

Twenty-four thousand dollars authorized in 1936 for purchase of lands for Homestead National Monument, Nebr., is being applied for purchase of 160.82 acres.

With an offer made by the Whitman Centennial, Inc., and the Walla Walla Foundation to donate land comprising the site of the Indian Mission established in 1836 by Marcus Whitman, there remains only formal acceptance of title by the Department for establishment of Whitman National Monument, Wash., authorized by an act of June 29, 1936.

PROPOSED NATIONAL PARKS

A bill, H. R. 10435, was introduced in the Seventy-fifth Congress to authorize the establishment of the Kings Canyon National Park. The Kings River region north of Sequoia National Park in California has been urged for inclusion in the national park system since 1890. As a result of a careful study, the boundary lines have now been drawn so as to eliminate important power and irrigation dam sites without sacrificing the outstanding scenic features of the region.

Resolutions from more than 30 organizations and a great number from private individuals were received favoring the proposed park. Now that there is no conflict between the proposed park and the power and irrigation advocates, it is hoped that a better understanding of the proposal may result in the establishment of the park during the next session of Congress.

A bill, H. R. 6599, was introduced by Congressman Brewster to authorize the establishment of the Katahdin National Park in the State of Maine. As a result of a very careful field investigation last fall, a report was compiled on the Katahdin area. Further studies of this region are now being made.

A bill, H. R. 10239, was introduced in Congress to establish the Green Mountain National Park in Vermont. The proposed legislation, which received the approval of the Department, would preserve a section of typical New England landscape.

PROPOSED NATIONAL SEASHORES

The Service has continued its study of approximately 20 areas along the Atlantic, Gulf, Pacific, and Great Lakes shores, which were given a preliminary survey in 1935, as possible national seashores.

PROPOSED NATIONAL MONUMENTS

Negotiations were continued for establishment of a section of the Escalante area along the Colorado River watershed in Utah as a national monument.

Only formal acceptance of title to certain privately owned property is delaying establishment of a national monument on the site of the Tuzigoot ruins near Clarksdale, Ariz. Investigations by archeologists who supervised excavation and restoration of the ruins indicate three major southwestern cultures were present simultaneously in the prehistoric past.

A long, narrow strip of exceedingly white sand on Santa Rosa Island in Escambia County, Fla., which, in geologic terms, is illustrative of a process of aggradation, has been approved for establishment as Santa Rosa National Monument. The major portion of the island, now owned by Escambia County, is in process of transfer to the Federal Government.

The proposed Indian Mounds National Monument, Iowa, containing extraordinary examples of Indian mounds, has been investigated and approved for establishment when the land has been acquired and donated to the Federal Government.

An area of approximately 27,450 acres in New Mexico and Arizona, containing archeological ruins of great scientific importance, has been approved by the Department for establishment as Puerco National Monument. The acquisition of certain necessary lands by local people for donation to the Federal Government has been undertaken.

Areas Investigated During the Fiscal Year for Possible Inclusion in the
Federal Park System

1. Coast Redwoods National Park Area, Calif.
2. Columbia Gorge Recreational Area, Oreg.
3. Flathead National Park Area, Mont.
4. Fort Peck Recreational Area, Mont.
5. Gila National Park Area, N. Mex.
6. Glacial Grooves National Monument, Ohio.
7. Grand Coulee Recreational Area, Wash.
8. Grasslands National Monument, S. Dak.-Nebr.
9. Hart Mountain National Monument, Oreg.
10. Luquillo National Park, Puerto Rico.
11. Newberry Crater National Monument, Oreg.
12. Northern Cascades National Park Area, Wash.
13. Superior National Park, Minn.
14. Palmyra Island National Monument, Territory of Hawaii.
15. Palm Canyon National Monument, Calif.
16. Porcupine Mountains National Park, Mich.
17. Roosevelt Badlands National Monument, N. Dak.
18. San Juan National Park Area, Colo.
19. San Juan Islands National Monument, Wash.
20. San Juan National Monument, Puerto Rico.

21. Ship Island National Monument, Miss.
22. Waimea Canyon National Park, Territory of Hawaii.
23. Wind River National Park, Wyo.
24. Cumberland Gap National Historical Park, Tenn.-Ky.-Va.

CIVILIAN CONSERVATION CORPS ACTIVITIES

The fiscal year closed with 294 C. C. C. camps operating under technical supervision of the Service, compared with 418 on July 1, 1937. Camps in operation at the close of the year included 78 on continental national parks and 216 on State, county, and metropolitan parks and recreation areas and recreational demonstration areas. During the year the Corps carried on a general program of conservation and recreational development involving construction of such facilities as roads, trails, dams, cabins, and simple park structures, water and sanitary systems, for both extended and day use of areas.

Of the 5,000 enrollees authorized by the Civilian Conservation Corps Act of June 28, 1937, for projects in the Territories and insular possessions, 1,200 were allotted to the Department of the Interior.

In the Territory of Hawaii, 800 men are enrolled in the Corps, 200 of whom are at work in Hawaii National Park and 600 on lands of the Territorial government. Wild sheep, goats, and boar, which destroyed vegetation and prevented natural regeneration were materially reduced in number, and important areas were fenced and planted. At the end of the year, 10,725,000 trees had been planted on 21,450 acres since the program was started.

In the Virgin Islands, 300 enrollees were authorized for St. Thomas and 100 for St. Croix. Old roads were widened, realigned, and put in condition, and general conservation work was performed.

For the first time in the history of the C. C. C. enrollees were transported from the States to a Territorial possession. Two hundred men selected from Oregon and Washington were organized for 1938 summer work in a camp established in Mount McKinley National Park, Alaska.

RECREATIONAL DEMONSTRATION AREAS

Development of 46 recreational demonstration projects on 62 areas in 24 States was continued with both E. R. A. and C. C. C. labor employed. Forty-eight of sixty-four organized camps under construction on 34 of these areas were scheduled to be completed and in use for the summer of 1938. Thirty-one of these were finished before the end of the fiscal year. These facilities, which received 100,000 camper-days use and provided recreation for 1,000,000 day-use visitors in 1937, include adequate systems of control roads, water and sanitary systems, central administration and service groups, facilities for centralized feeding, decentralized camping, and such activities as swimming, boating, hiking, and picnicking. General

conservation treatment is also applied on each area, and in some instances certain portions are set aside as wildlife refuges.

The recreational demonstration area program also includes the laying out of 13 wayside parks contiguous to main highways in Virginia and South Carolina for the use of travelers. These are being equipped with picnic tables and benches, water, and sanitary facilities.

Developments under this program have been carried on by 8,000 relief workers and 2,300 C. C. C. enrollees. A total of 352,874 acres of land have been acquired for this purpose, title to 253,361 acres of which was cleared in the 1938 fiscal year.

EMERGENCY RELIEF ACT PROJECTS

E. R. A. Federal and non-Federal projects in operation by the Service totaled 65 at the close of the fiscal year, compared with 84 at the end of the 1937 fiscal year. Curtailment of funds in the period July 1 to December 31, 1937, necessitated termination of operations on 34 non-Federal projects, and on June 30, 1938, only four non-Federal E. R. A. projects remained under Service supervision.

The Service received funds from the Emergency Relief Appropriation Act of 1937, and the Emergency Relief Supplementary Appropriation Act, approved March 2, 1938, for land acquisition and development and research projects in 9 national parks, 4 national military parks, 9 national monuments, 1 national historical park, 44 recreational demonstration areas, 2 parkways, 1 beach erosion control project, 20 State, 3 county, and 12 municipal park areas. In addition, there were 7 nonconstruction projects in 3 States and the District of Columbia employing white-collar research workers. These appropriations and projects gave employment to an average of 10,500 relief workers, of which 7,500 were local workers and 3,000 workers quartered in subsistence camps operated by the Service. Relief workers were also employed by contractors on some of these Service projects.

UNITED STATES TRAVEL BUREAU

A bill to promote travel in the United States through the United States Travel Bureau, H. R. 9212, failed to pass in the Seventy-fifth Congress. Passed by the Senate, the bill remained in the House Committee on Interstate and Foreign Commerce at the hour of adjournment.

The Bureau continued to function on an emergency basis and extended its activities. During the year the name was changed from Tourist to Travel Bureau.

Thirty-five hundred dollars donated by the American Express Co. for the work of the Bureau was accepted by the Department in July 1937.

THE PARK, PARKWAY, AND RECREATIONAL-AREA STUDY

During the year arrangements were completed in 43 States for the conduct of this study authorized under Public 770½, Seventy-fourth Congress, in cooperation with established State recreation and planning agencies. Tentative final State reports were completed by Virginia, Illinois, Mississippi, Nevada, Louisiana, Tennessee, and Pennsylvania. These reports, containing preliminary plans and recommendations for meeting the recreational needs of each State, were reviewed and concurred in by the Service as the basis for further study and returned to the States with detailed suggestions for their completion. Indiana also submitted its tentative final report, which is being studied.

The completed reports will constitute comprehensive plans to serve as a guide in coordinating all recreational areas and agencies as a complementing and supplementing recreation system for each State. Later, regional and national studies will be based on these State plans. Information on Federal lands and facilities available for recreation was received from other Federal agencies in response to this Department's requests.

COOPERATION WITH STATES EXTENDED

During the year the Service has cooperated with the United States Corps of Engineers and State planning commissions and conservancy districts in planning proper recreational use of lakes and pools created by flood-control projects.

In addition to assisting in planning new parkway developments, the Service also has given advice to several States on interstate compacts relating to the establishment, development, and operation of interstate parks and parkways.

Three publications bearing on State and local park development work were issued by the Service in the 1938 fiscal year. *Park and Recreation Structures* discusses and pictures by drawings and photographs structural undertakings appropriate to natural park and recreational area environments. This 600-page publication was issued in three parts, subtitled "Administration and Basic Service Facilities," "Recreational and Cultural Facilities," and "Overnight and Organized Camp Facilities." The 1937 Yearbook—*Park and Recreation Progress*—contains a report on the progress of State cooperative work in park and recreational development, and articles on various allied subjects. *Municipal and County Parks in the United States, 1935*, was based upon an original study made by the Service in cooperation with the National Recreation Association.

MAINTENANCE OF FEDERAL BUILDINGS

At the close of the fiscal year, the National Park Service was responsible for the maintenance and operation of 21,122,615 square

feet of floor space in the District of Columbia, of which 18,303,567 square feet was in 46 Government-owned buildings, and 2,819,048 square feet in 64 privately owned buildings. Similar service was rendered in 11 Government-owned office buildings, having a total floor area of 1,267,561 square feet, located in 9 other cities. Seven special structures are also maintained by the branch of the Service engaged in building maintenance. The only noteworthy changes during the year were the acquisition of the Federal Trade Commission Building, transferred upon completion by the Treasury Department, effective March 1; and the demolition of Temporary Building F.

The White House continued to receive the most careful maintenance.

Personnel employed and funds expended incident to providing this service were as follows:

	Person- nel	Expenditures		
		Gross	Reimburs- able	Net
Buildings in the District of Columbia.....	¹ 5,388	\$9,687,071	\$2,592,582	\$7,094,489
Buildings outside the District of Columbia.....	² 315	585,230	3,726	581,504
Total.....	5,703	10,257,031	2,577,366	7,679,665

¹ Includes 587 temporary.

² Includes 16 temporary.

The act making appropriations for the Service authorized the expenditure of not to exceed \$500,000 for major repairs and improvements. Among the projects accomplished with this fund were the replacement of certain defective concrete flooring and the installation of new wiring in the Navy and Munitions Buildings; the replacement of a portion of the obsolete lighting fixtures in those buildings and in the building at 1300 E Street NW., with fixtures of modern design; procurement of a turbine-driven boiler feed pump, the construction of catwalks, and the elimination of a dangerous condition on the coal conveyor at the Central Heating Plant; the installation of emergency exit platforms in the elevator shaft at the Washington Monument; the replacement of the circulating pumps at Columbus Fountain; the installation of venetian blinds in a portion of the Internal Revenue Building; the installation of a telephone system in the steam distribution tunnels radiating from the Central Heating Plant; the installation of flood-control pumps, actuated by independent power supply, in the new buildings along Constitution Avenue; and improvements to the ventilating systems in certain elevator penthouses and electrical vaults.

The service of the Central Heating Plant was extended to the Federal Trade Commission Building, the new Police Court Building in Judiciary Square, the National Gallery of Art, the new building of the Bureau of Engraving and Printing, the Wilkins Building, and the building at 1510 H Street NW. The addition of these buildings increased the potential connected load by 141,500 pounds of steam per hour. Owing to the mild winter, only 95,472 tons of coal were consumed at the plant, the total steam generated being 2,056,099,000 pounds.

The operation of the guard school was continued, 20 hours of instruction being given each student. Also, a course of instruction was instituted for elevator conductors, comprising five 1-hour lectures and demonstrations.

SPACE CONTROL

At the close of the fiscal year, space aggregating 14,354,352 net square feet was occupied by Government agencies in 110 Government-owned buildings in the District of Columbia, housing 79,199 employees, under authorization from the National Park Service, the Service being responsible for allocation and proper utilization of space in nearly all of the Federal buildings in the District. Also, a total of 3,245,775 net square feet of space in 118 privately owned buildings, housing 27,657 employees, was being leased at an annual rental of \$2,906,654.37, by or with the approval of the National Park Service, making a total of 17,600,127 square feet of space occupied by 106,858 employees in 228 buildings.

Forty changes in space allocations in Government buildings were approved, and 507 moves were accomplished.

CONCLUSION

The dual function of the National Park Service as specified by law—that of conserving the intricate and involved inter-relationship of all the organisms that combine to make up the natural features of a national park and at the same time permitting man to come into and enjoy that park—presents one of the most complex biological problems known.

The conflict between complete preservation and wise use is always present, and to solve the problem in a manner that will give the best future results requires an unusual degree of sound judgment, administrative ability, and technical skill.

Since 1933, a prodigious amount of new work has come to the Service through consolidation of Federal park supervision, emergency activities, and natural growth. As a result of a shortage of positions in technical lines in the industrial world, the Service fortunately was able to employ a number of excellently trained specialists of high

ideals. As the amount of emergency funds available to the Service has decreased, the Service has been forced to dispense with the services of many of these men and women and it has not been possible to secure a commensurate number of civil-service positions to carry on the work as effectively as desired.

One of the most serious problems facing the Service today, therefore, is the necessity of obtaining an adequate basic permanent personnel in all administrative, protective, and technical lines to carry on the administration, protection, maintenance, and improvement of the areas in the Federal park system in such a manner as to provide the greatest possible degree of use and enjoyment for the people, while preserving the areas for coming generations.

Not only should the personnel of long-established parks and monuments be increased to meet the needs incident to expanded popular use, but permanent personnel should replace emergency personnel in the administration and developing of the military and historical areas more newly assigned to Service supervision.

Unless the situation is taken care of in the near future, it may become acute, as already indicated by the contraction of the emergency personnel organizations begun 2 years ago.

TABLE I.—Holdings Acquired for National Park and Monument Purposes

Parks, monuments, and parkways	Holdings acquired from July 1, 1937, through June 30, 1938						Total hold- ings acquired through June 30, 1938, in acres	
	Holdings acquired by purchase			Holdings acquired otherwise than by purchase		Total ac- quired in acres		Holdings ac- quired prior to July 1, 1937, in acres
	Government funds	Donated funds	Area in acres	How acquired	Area in acres			
Acadia National Park.....				Donation.....	706.137	706.137	15,940.090	16,646.227
Black Canyon of the Gunnison National Monument.....				do.....	120.000	120.000	255.000	375.000
Blue Ridge Parkway.....				do.....	1,469.690	1,469.690	3,502.590	4,972.280
Boulder Dam Recreational Area.....				do.....	15.930	15.930		15.930
Chickamauga and Chattanooga National Military Park.....				do.....	.082	.082	8,629.130	8,629.212
Colonial National Historical Park.....	\$475.00		1.500	do.....	22.305	23.805	6,301.960	6,325.765
Fredericksburg and Spotsylvania National Military Park.....				do.....	42.811	42.811	2,285.280	2,328.091
Glacier National Park.....	13,607.17	\$13,607.17	480.520	Exchange.....	680.000	480.520	5,006.560	5,487.080
Grand Canyon National Park.....				Donation.....	639.750	25,913.850	34,757.720	35,447.720
Great Smoky Mountains National Park.....	501,153.07		25,274.100	Do.....		5,815	80.700	86.515
Hot Springs National Park.....	9,852.00		5.815	Do.....	2,900	73,605.040	28,810.200	102,415.240
Isle Royale National Park.....	373,573.69		73,602.140	Do.....	963.380	477.930	170.100	648.030
Kennesaw Mountain National Battlefield Park.....	17,335.00		477.930	Do.....	69.416	3,984.850	34,560.314	38,545.164
Mammoth Cave National Park.....	125,378.00		3,021.470	do.....	88.734	1,850.100	1,938.834	1,938.834
Petersburg National Military Park.....	3,650.00		19.318	do.....	8.289	80.630	38.160	118.190
Salem Maritime National Historical Site.....				Do.....	7,275.310	7,275.310	30,707.380	7,275.310
Vicksburg National Cemetery.....	78,940.00		80.030	Do.....		275.590	407,443.556	30,982.970
Wupatki National Monument.....	24,303.14	17,130.50	275.590					
Yosemite National Park.....								
Acres acquired in other areas prior to July 1, 1937.....								
Total.....	1,148,267.07	30,737.67	103,238.413		12,016.000	115,254.413	992,037.960	699,848.817
Grand total.....								1,107,292.373

¹ Includes 27,535 acres outside of the minimum area required for the establishment of the park.

TABLE 2.—Automobile and Motorcycle Licenses Issued and Revenues Received, Fiscal Years 1937-38

Name of park	1937			1938		
	Auto-mob-iles	Motor-cycles	Revenue	Auto-mob-iles	Motor-cycles	Revenue
Crater Lake	42,754		\$42,754	45,719		\$45,719
General Grant	10,002		10,002	13,500		13,500
Glacier	39,662	86	30,748	33,624	60	33,684
Grand Canyon	65,601		65,601	80,146		80,146
Lassen Volcanic	14,051	11	14,062	15,619		15,619
Mesa Verde	6,093		6,093	6,082		6,082
Mount Rainier	53,693		53,693	54,144		54,144
Sequoia	33,908		33,908	35,745		35,745
Yellowstone	110,429	348	331,635	117,070	487	351,698
Yosemite	99,732	206	199,670	99,766	226	199,757
Zion	37,620		37,620	37,372		37,372
Total	504,545	651	825,786	538,787	773	873,466

TABLE 3.—Appropriations for Administration, Protection, and Maintenance, Expenditures Therefrom, and Revenues, Fiscal Year 1938

Name of park	Appropriated	Expenditures and obligations	Revenues received
Acadia	\$47,710.00	\$46,457.95	\$524.00
Bryce Canyon	12,350.00	12,513.96	
Carlsbad Caverns	103,000.00	99,481.22	304,326.52
Crater Lake	73,730.00	77,594.16	49,383.32
General Grant	17,570.00	17,488.69	14,857.52
Glacier	189,120.00	184,468.42	42,469.83
Grand Canyon	118,500.00	119,454.07	99,753.75
Grand Teton	25,530.00	25,191.72	499.47
Great Smoky Mountains	76,500.00	74,314.40	7,759.14
Great Smoky Mountains (land acquisition), deficiency	743,265.29		
Hawaii	50,100.00	50,931.29	1,176.50
Hot Springs	72,500.00	71,173.50	38,925.77
Lassen Volcanic	35,000.00	36,476.12	16,458.74
Mammoth Cave			14.12
Mesa Verde	55,540.00	56,959.53	6,588.27
Mount McKinley	29,000.00	27,888.46	3,336.16
Mount Rainier	141,486.00	150,920.53	57,115.41
National Capital Parks, U. S.	176,000.00	169,516.88	11,682.04
National Capital Parks, D. C.	918,880.00	912,830.20	
Platt	20,600.00	20,231.18	1.00
Rocky Mountain	82,000.00	82,859.29	2,304.13
Sequoia	104,100.00	108,903.80	47,483.63
Shenandoah	58,000.00	57,932.64	5,456.76
Wind Cave	18,520.00	17,614.60	12,041.23
Yellowstone	411,000.00	427,638.26	440,555.05
Yosemite	301,600.00	318,437.07	287,358.13
Zion	40,450.00	42,976.23	37,909.97
National Historical Parks and Monuments	127,000.00	130,149.45	773.17
National Monuments	205,600.00	196,876.35	1,350.08
Homestead National Monument	24,000.00	18,114.15	
Oregon Caves National Monument	20,000.00	18,560.58	
National military parks, battlefields, monuments, and cemeteries	300,660.00	276,421.54	12,262.90
Kennesaw Mountain National Battlefield Park	30,000.00	28,605.74	
Boulder Dam recreational area	45,000.00	44,481.17	15.00
National Park Service	196,940.00	185,417.66	159.60
Public buildings and grounds	7,706,280.00	8,144,855.08	4,923.68
General expenses, N. P. S.	27,000.00	27,011.41	
Forest protection and fire prevention	100,000.00	83,566.60	
Emergency reconstruction and fighting forest fires	40,000.00	44,708.03	
Emergency reconstruction and fighting forest fires, deficiency	40,000.00		
Construction of roads and trails	4,500,000.00	3,983,615.10	
Blue Ridge and Natchez Trace Parkways	6,000,000.00	603,127.07	137.00
Historic sites and buildings	24,000.00	21,323.25	
Investigation and purchase of water rights	25,000.00	17,078.37	
Miscellaneous			19.95
Total	23,333,525.29	17,034,165.72	1,504,561.84

¹ Available until expended.² Represents expenditures only.

TABLE 4.—Summary of Appropriations for the Administration, Protection, and Improvement of Areas Under the Jurisdiction of the National Park Service, Together With the Revenues Received, for the Fiscal Years 1917 ¹ to 1938, Inclusive

Year	Department	Appropriation	Revenues
1917	Interior Department.....	\$537,356.67	
	War Department.....	247,200.00	
		\$784,566.67	\$180,652.30
1918	Interior Department.....	530,680.00	
	War Department.....	217,500.00	
		748,180.00	² 217,330.55
1919	Interior Department.....	963,105.00	
	War Department.....	50,000.00	
		50,000.00	
		1,013,105.00	196,678.03
1920		907,070.76	316,877.96
1921		1,058,969.16	396,928.27
1922		1,433,220.00	432,964.89
1923		1,446,520.00	513,706.36
1924		1,892,601.00	663,886.32
1925		3,027,657.00	670,920.98
1926		3,258,409.00	826,454.17
1927		3,698,920.00	703,849.60
1928		4,889,685.00	808,255.81
1929		4,754,015.00	849,272.95
1930		7,813,817.18	1,015,740.56
1931		12,113,435.00	940,364.79
1932		12,831,250.00	820,654.19
1933		10,640,620.00	628,182.06
1933-35		53,402,249.00	
1934		10,983,089.00	731,331.80
1935		12,461,513.00	907,189.96
1936		16,686,090.00	1,136,533.68
1937		18,190,490.00	1,398,691.66
1938		23,333,525.29	1,504,561.84

¹ For summary of appropriations and revenues prior to 1917 see 1920 Annual Report, p. 359.

² The revenues from the various national parks were expendable during the years 1904 to 1918, inclusive, with the exception of those received from Crater Lake, Mesa Verde, and Rocky Mountain National Parks, the revenues from which were turned into the Treasury to the credit of miscellaneous receipts.

TABLE 5.—Forest-fire Statistics, Calendar Year 1937

Name	Classification				Point of origin				Causes of fires								Grand total	
	A, ¼ acre or less	B, between ¼ and 10 acres	C, 10 acres or over	Total, all classes, A, B, C	Inside parks		Outside parks		Lightning	Campfires	Smokers	Debris burning	Incendiary	Lumbering	Railroads	Miscellaneous		Total man-caused
					On Government land	On private land	Entered park	Confined to outside areas										
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
REGION I																		
National parks:																		
Acadia.....	2	6	1	7	2	3	1	5	1	1	1	2	19	1	1	1	7	7
Great Smoky Mountains.....	11	19	5	26	12	10	2	10	1	2	9	8	22	45	4	4	25	26
Mammoth Cave.....	2	28	6	45	28	9	4	6	1	1	1	7	6	19	4	4	45	45
Shenandoah.....		9	8	19	9												19	19
Military and historical parks:																		
Chickamauga-Chat-tanooga.....	5	3	4	12	10		2				9	2			1		12	12
Colonial.....	4	3	3	10	5	1	1	3			9	1					10	10
Fredericksburg.....		1		1				1									1	1
Morristown.....	2			2	2						2						2	2
Petersburg.....			2	2							1						2	2
Shiloh.....	1	4	1	6	4			2			3						6	6
Vicksburg.....	3	3	3	6	3		3				4						6	6
National Capital parks.....	1	2	1	4	3						2				1		4	4
Blue Ridge Parkway.....		2	3	6	1			5			1				1		4	6
Total.....	32	80	34	146	79	14	14	39	1	5	49	20	53	1	2	15	145	146
REGION II																		
National parks:																		
Grand Teton.....	23		1	24	22			2	6	5	10	2				1	18	24
Rocky Mountain.....	2			2	2				2								2	2
Yellowstone.....	37	4	2	43	41			2	18	6	19						25	43
Total.....	62	4	3	69	65			4	26	11	29	2				1	43	69

REGION III

REGION III					
National parks:					
Grand Canyon.....	20	3	23	22	17
Hot Springs.....	5	2	2	2	2
Mesa Verde.....	4	5	3	3	5
Platt.....	4	4	4	4	4
National monuments:					
Bandelier.....	5	2	3	3	2
Saguaro.....		3	8	8	8
Total.....	34	10	45	42	32
<hr/>					
REGION IV					
National parks:					
Bryce Canyon.....	4		4	4	
Crater Lake.....	9	1	10	10	9
General Grant.....	7		7	2	4
Glacier.....	26	4	31	25	24
Lassen Volcanic.....	7	1	8	6	6
Mount Ranier.....	9		9	9	7
Sequoia.....	11	4	15	13	7
Yosemite.....	25	10	35	35	12
Zion.....	1		1	1	1
National monuments:					
Lava Beds.....	1	1	6	4	1
Pinnacles.....			1		1
Total.....	100	20	127	109	69
<hr/>					
Grand total.....	228	114	45	18	14
<hr/>					

REGION IV

[illegible]

National monuments:									
Bandelier.....	83							83	213
Saguaro.....	9							9	105
Total.....	96							96	488
REGION IV									
National parks:									
Bryce Canyon.....				1					42
Crater Lake.....	2							2	281
General Grant.....									68
Glacier I.....	8								1,843
Lassen Volcanic.....	1								172
Mount Rainier.....									64
Sequoia.....	8								369
Yosemite.....	9			29					349
Zion.....									329
National monuments:									
Lava Beds.....				30					1
Pinnacles.....									98
Total.....	28	8	770	59	1,103	725	40	806	3,918
Grand total.....	688	13	871	77	1,163	861	310	1,572	13,006

¹ Glacier—Emergency allotment from Emergency relief and forest-fire funds, \$585.

COOPERATION

Park or monument	Contributed by protection agency					Contributed to protection agency	Value of service	C. C. C. man-days
Acadia.....							\$64	
Blue Ridge Parkway.....							850	
Great Smoky Mountains.....							167	
							2	
							38	
							100	
Mammoth Cave.....							1	
Morristown.....							4	
National Capital Parks.....							22	
Crater Lake.....							10	
Yellowstone.....							6	
Grand Teton.....								661
						U. S. Forest Service.....		380

TABLE 6.—Interpretational Activities of the Branch of Research and Education, National Park Service

National parks and monuments	Guided trips		Lectures		At- tended exhibits	Unat- tended ex- hibits	Total contacts	Total park visi- tors
	Num- ber	Attend- ance	Num- ber	Attend- ance				
Acadia.....	137	27,826	115	19,071	465	-----	47,362	450,000
Bryce Canyon.....	68	9,960	154	17,069	15,238	-----	42,267	97,162
Carlsbad Caverns.....	-----	216,316	-----	11,359	-----	-----	227,675	216,316
Crater Lake.....	157	2,386	358	24,277	56,340	-----	83,003	194,025
General Grant.....	10	262	11	1,701	3,500	-----	5,463	152,090
Glacier.....	353	8,493	220	15,062	4,762	-----	28,317	212,106
Grand Canyon.....	378	31,386	1,355	141,675	170,339	2,377	345,777	318,501
Grand Teton.....	39	1,020	46	9,060	18,132	-----	28,212	73,559
Hawaii.....	262	8,404	215	14,567	26,989	33,742	83,702	199,833
Hot Springs.....	1	50	10	715	11,389	-----	12,154	119,888
Lassen Volcanic.....	221	7,406	83	16,680	33,103	2,000	59,189	80,619
Mesa Verde.....	271	31,807	36	10,521	28,250	300	70,878	27,650
Mount McKinley.....	3	110	37	947	-----	-----	1,057	1,354
Mount Rainier.....	720	14,213	526	40,191	224,280	-----	278,684	394,038
Rocky Mountain.....	178	4,652	249	16,455	30,514	-----	51,621	526,096
Sequoia.....	126	5,477	540	128,870	29,836	-----	164,183	258,160
Wind Cave.....	-----	12,441	-----	-----	-----	-----	12,441	12,441
Yellowstone.....	1,536	94,879	2,016	691,700	670,464	8,617	1,465,660	484,490
Yosemite.....	625	57,129	2,325	422,966	340,563	-----	820,658	445,215
Zion.....	47	8,429	221	21,549	41,409	4,500	75,887	142,612
National Capital Parks.....	58	3,932	75	22,257	1,494	1,000	28,683	-----
Great Smoky Mountains.....	7	23	2	1,200	-----	-----	1,223	675,519
Mammoth Cave.....	-----	81,925	-----	-----	-----	-----	81,925	131,815
Southwestern Monuments.....	17,534	98,635	10,168	58,312	-----	145,604	302,551	289,071
Cedar Breaks.....	-----	-----	-----	-----	2,109	-----	2,109	14,768
Death Valley.....	1	20	149	6,922	-----	700	7,642	57,064
Dinosaur.....	-----	-----	2	314	-----	-----	314	6,502
Lava Beds.....	1,238	5,822	22	4,174	25,388	8,141	43,525	29,985
Lehman Caves.....	413	2,327	-----	-----	-----	-----	2,327	3,071
Muir Woods.....	1	60	5	302	2,198	-----	2,560	77,622
Oregon Caves.....	-----	-----	511	10,815	2,150	105	13,070	56,011
Petrified Forest.....	-----	-----	-----	-----	113,629	6,700	120,329	144,213
Pinnacles.....	-----	-----	9	301	-----	-----	301	19,018
Scotts Bluff.....	261	1,628	794	8,072	26,957	-----	36,657	81,383
Timpanogos Cave.....	927	11,947	-----	-----	-----	-----	11,947	11,947
Boulder Dam.....	59	1,167	1,835	24,484	18,906	-----	44,557	568,104
Total.....	25,630	750,132	22,088	1,741,588	1,898,404	213,786	-----	-----

Total of contacts by educational services, 4,603,910.

Total of park visitors in 36 park areas having interpretative services, 6,572,248.

Percentage of park visitors served by the educational activities, 70 percent.

TABLE 7.—Office Buildings in the District of Columbia Maintained, Operated, and Protected by the National Park Service

Building	Location	Government owned gross floor area	Rented net floor area
Agricultural Annex.....	12th and C Sts. SW.....	86,000	-----
Agriculture Administration.....	The Mall at 13th St. SW.....	307,692	-----
Agriculture Mechanical Shops.....	Constitution Ave. and 13th St. NW.....	32,058	-----
Agriculture, South.....	Independence Ave., 12th, and 14th Sts. SW.....	2,056,430	-----
Archives.....	Constitution Ave., 7th, and 9th Sts. NW.....	1,173,557	-----
Arlington.....	Vermont Ave. and H St. NW.....	575,000	-----
Army Medical Museum.....	7th St. and Independence Ave. SW.....	83,938	-----
Atlantic ¹	928-930 F St. NW.....	-----	38,337
Barber & Ross ¹	11th and G Sts. NW.....	-----	² 30,750
Barr ^{1 2}	910 17th St. NW.....	-----	32,085
Bureau of Fisheries.....	6th St. and Independence Ave SW.....	39,131	-----
C St. NW., 2115.....	-----	35,000	-----
Central Heating Plant.....	12th, 13th, C, and D Sts. SW.....	-----	-----
City Club.....	1320 G St. NW.....	-----	48,610
Civil Service.....	7th, 9th, F, and G Sts. NW.....	246,244	-----
Commerce.....	Constitution Ave., 14th, 15th, and E Sts. NW.....	1,605,066	-----

See footnotes at end of table.

TABLE 7.—Office Buildings in the District of Columbia Maintained, Operated, and Protected by the National Park Service—Continued

Building	Location	Government owned gross floor area	Rented net floor area
Connecticut Ave., 815			² 119,800
Connecting Wing	Between I. C. C. and Labor Buildings	234, 100	
Daily News	1322 New York Ave. NW		18,000
De Moll ²	12th and G Sts. NW		15,243
E Building	6th St. and Maine Ave. SW	231, 771	
E St. NW., 1300		274, 373	
E St. NW., 1345 ¹			7, 544
Executive Office	West Executive Ave.	40,000	
F St. NW., 1723-1725		20, 369	
F St. NW., 1724			² 53, 676
Federal Home Loan Bank Board	101 Indiana Ave. NW	278, 700	
Federal Trade Commission	Constitution Ave., 6th, and 7th Sts. NW	303, 000	
Florida Ave. NE., 60			27, 200
G St. NW., 1328 ¹			3, 540
G St. NW., 1333			15, 000
G St. NW., 1338-1340			16, 896
G St. NW., 1342 ¹			3, 190
G St. NW., 1712			² 93, 929
G St. NW., 1712 (annex)		8, 166	
Garage (Veterans' Administration)	Kansas Ave. & Upshur St. NW		43, 723
Garage	3d and Canal Sts. SW	48, 000	
Garage (White House)	1126 21st St. NW		² 90, 788
Garage (Interior)	21st St. and Virginia Ave. NW	36, 000	
Garage	24th and M Sts. NW		² 48, 800
General Accounting Office	Judiciary Square	196, 554	
H St. NW., 1510			8, 738
H St. NW., 1712 ¹			7, 068
H St. NW., 1825			² 199, 344
Hurley-Wright	18th St. and Pennsylvania Ave. NW		² 95, 091
I St. NW., 1500			24, 000
I St. NW., 1624			² 17, 700
Independence Ave. SW., 310		25, 270	
Independence Ave. SW., 816		4, 239	
Independence Ave. SW., 908		17, 408	
Interior	C, E, 18th, and 19th Sts. NW	1, 308, 300	
Interior, North	E, F, 18th, and 19th Sts. NW	726, 535	
Internal Revenue	Constitution Ave., 10th, and 12th Sts., NW	1, 281, 000	
Interstate Commerce	12th St. and Constitution Ave. NW	456, 700	
Justice	Constitution Ave., 9th and 10th Sts. NW	1, 237, 000	
K St. NW., 1435			15, 000
K St. NW., 1437			² 20, 000
K St. NW., 1518 ²			10, 632
Kalorama Rd., 1700			28, 000
Kalorama Rd., 1701 ¹			38, 084
Kalorama Rd., 1724			21, 000
L St. NW., 1709			20, 397
Labor	14th St. and Constitution Ave. NW	447, 000	
La Salle ¹	1028 Connecticut Ave. NW		49, 416
Lemon	1729 New York Ave. NW		² 25, 975
Lenox ³	1523 L St. NW		22, 924
M St. NW., 2214-16			9, 317
Massachusetts Ave. NW., 2000			² 24, 309
Mather ^{1 3}	916 G St. NW		37, 937
McCrory ¹	824-26 7th St. NW		10, 683
McKinley Park ³	17 buildings, American University Park		67, 062
Moses ¹	11th and F Sts. NW		97, 378
Munitions	Constitution Ave., 19th and 21st Sts. NW	851, 490	
National Theater ^{2 3}	1325 E St. NW		16, 000
Navy	Constitution Ave., 17th and 19th Sts. NW	949, 182	
Ouray ^{1 3}	801 G St. NW		21, 068
Pennsylvania Ave. NW., 1778			² 207, 550
Post Office (new)	13th St. and Pennsylvania Ave. NW	840, 000	
Post Office (old)	12th St. and Pennsylvania Ave. NW	377, 951	
Potomac Park Apartments	306 21st St. NW	108, 000	
Printer ^{1 3}	930 H St. NW		61, 811
Procurement Division	8th and D Sts. SW	886, 750	
Public Health	Constitution Ave., 19th and 20th Sts. NW	79, 931	
Rizik ^{1 3}	1737 L St. NW		15, 983
South Capitol St., 401			55, 080
Standard Oil ^{1 3}	261 Constitution Ave. NW		36, 469
State Department	17th St. and Pennsylvania Ave. NW	440, 250	
Tariff Commission	7th, 8th, E, and F Sts. NW	140, 118	
Temporary No. 2	19th and D Sts. NW	78, 240	
U St. NW., 1331-41 ³			² 85, 725
Vermont Ave. NW., 1001 ³			² 119, 000

See footnotes at end of table.

TABLE 7.—Office Buildings in the District of Columbia Maintained, Operated, and Protected by the National Park Service—Continued

Building	Location	Government owned gross floor area	Rented net floor area
Vermont Ave. NW., 1025.....	-----	-----	54,696
Vermont Ct. NW., 1126.....	-----	-----	13,631
Walker.....	734 15th St. NW.....	-----	66,000
Walker-Johnson.....	1734 New York Ave. NW.....	-----	² 110,312
Washington Auditorium.....	19th St. and New York Ave. NW.....	-----	² 94,000
Wilkins.....	1514 H St. NW.....	54,000	-----
Willard.....	513-15 14th St. NW.....	-----	26,685
Winder.....	17th and F Sts. NW.....	63,880	-----
7th St. NW., 425.....	-----	-----	7,000
8th St. SW., 215.....	-----	5,970	-----
10th St. NW., 1918.....	-----	-----	48,799
12th St. SW., 224.....	-----	13,204	-----
14th St. NW., 509 ¹	-----	-----	6,540
14th St. NW., 1840.....	-----	-----	30,500
14th St. NW., 2303 ³	-----	-----	66,957
15th St. NW., 821.....	-----	-----	10,446
18th St. NW., 718.....	-----	-----	² 41,330
19th St. NW., 1220.....	-----	-----	² 44,100
26th St. NW., 501 and 513 ¹	-----	-----	22,200
Total.....	-----	18,303,567	2,819,048

¹ Portion of building only.² Gross area.³ Protection only.

TABLE 8.—Office Buildings Outside the District of Columbia Maintained, Operated, and Protected by the National Park Service

Building	Location	Government-owned gross floor area
Broadway, 45.....	New York City, N. Y.....	142,500
Courthouse.....	Aiken, S. C.....	17,474
Do.....	New York City, N. Y.....	655,787
Do.....	Parkersburg, W. Va.....	34,900
Do.....	Santa Fe, N. Mex.....	47,600
Federal Office.....	Des Moines, Iowa.....	64,200
Do.....	Galveston, Tex.....	15,000
Immigration Station.....	Baltimore, Md.....	98,000
Old Custom House.....	Denver, Colo.....	72,500
Old Post Office.....	Sacramento, Calif.....	47,600
Sub-Treasury.....	New York City, N. Y.....	72,000
Total.....	-----	1,267,561

TABLE 9.—Special Structures Maintained, Operated, and Protected by the National Park Service

Structure	Location
Columbus Fountain.....	Union Station Plaza.
District of Columbia War Memorial.....	West Potomac Park.
House where Lincoln died.....	516 10th St. NW.
Lee Mansion.....	Arlington, Va.
Lincoln Memorial.....	West Potomac Park.
Lincoln Museum.....	511 10th St. NW.
Washington Monument.....	The Mall between 14th and 17th Sts.

TABLE 10.—Statement Showing Work Accomplished at Civilian Conservation Corps Camps Under the Jurisdiction of the National Park Service, July 1, 1937, to June 30, 1938

Item	Unit	Total work accomplished July 1, 1937–June 30, 1938			
		New construction		Maintenance	
		National parks and monuments	State parks	Combined total national parks and State parks	National parks and monuments
Bridges, foot and horse	Number	10	49	59	21
Bridges, vehicle	Number	12	35	47	102
Barns	Number	2	3	5	8
Bathhouses	Number	3	29	32	4
Cabins, overnight	Number		254	254	
Combination buildings	Number		48	48	
Dwellings	Number	48	33	81	304
Equipment and supply storage houses	Number	39	67	106	38
Garages	Number	11	67	78	9
Latrines and toilets	Number	89	136	225	135
Lodges and museums	Number	4	22	26	21
Lookout houses	Number				5
Lookout towers	Number	3	3	6	1
Shelters	Number	15	83	98	6
Other buildings	Number	32	152	184	245
Cribbing, including filling	Cubic yards	700	16,999	17,699	3,580
Impounding and large diversion dams	Number	2	33	35	
Fences	Rods	11,637.5	61,299	72,936.5	22,916
Guard rails	Rods	1,809.5	16,837.3	18,646.8	644
Levees, dykes, jetties, and groins	Cubic yards		322,587	322,587	
Power lines	Miles	14.4	52.1	66.5	9.7
Incinerators	Number	5	63	68	2
Sewage and waste-disposal systems	Number	94	330	424	62
Telephone lines	Miles	140.5	119.3	259.8	1,260.8
Fountains, drinking	Number	64	138	202	
Pipe or tile lines	Linear feet	103,435	351,364	454,799	17,028
Storage facilities (omit last 000)	Gallons	88.6	613.5	702.1	
Wells, including pumps and pump-houses	Number	5	95	100	3
Miscellaneous, water supply systems	Number	1	15	16	12
Camp stoves or fireplaces	Number	177	2,162	2,339	37
Cattle guards	Number	1	20	21	
Corrals	Number	4	7	11	3
Seats	Number	102	1,836	1,938	103
Signs, markers, and monuments	Number	3,621	4,355	7,976	1,763
Stone walls	Rods	212.9	1,215.4	1,428.3	1,837
Table and bench combinations	Number	627	3,887	4,514	36
Tool boxes	Number	7	61	68	
Miscellaneous, other structural improvements	Number	440	3,168	3,608	10
Radio stations	Number				29
Springs	Number	16	12	28	3
Waterholes	Number		6	6	
Small reservoirs	Number	7	25	32	14
Landing docks and piers	Number	1	10	11	1
Truck trails or minor roads	Miles	156.2	403.5	559.7	2,786.1
Foot trails	Miles	62.1	130.5	192.6	291.3
Horse or stock trails	Miles	165	45.4	209.4	1,631.4
Stream and lake bank protection	Square yards	4,500	216,347	220,847	2,060
Bank sloping	Square yards	178,862	429,502	608,364	530,444
Check dams, permanent	Number	429	2,226	2,655	
Check dams, temporary	Number	3,529	1,165	4,694	214
Seeding and sodding	Square yards	164,622	286,156	450,778	344,800
Tree planting, gully	Square yards	112,740	46,850	159,590	
Ditches, diversion	Linear feet	6,360	11,950	18,310	6,800
Terracing	Miles	7.3	2	9.3	
Planting, seed, or sod	Square yards		6,400	6,400	
Wind erosion area treated	Acres		19	19	
Water spreaders (rock, brush, wire)	Linear feet		2,309	2,309	
Clearing and cleaning channels and levees	Square yards		66,049	66,049	
Clearing and cleaning reservoir, pond, and lake sites	Acres		2,043.7	2,043.7	
Lining of waterways	Square yards	4,560		4,560	
Excavation, canals, channels, ditches, earth	Cubic yards	76,983	1,062,302	1,139,285	
Excavation, canals, channels, ditches, rock	Cubic yards	62	2,375	2,437	
Pipe and tile lines and conduits	Linear feet	9,072	12,477	21,549	25
Riprap or paving, rock or concrete	Square yards	8,501	35,522	44,023	
Riprap or paving, brush or willows	Square yards	4,200		4,200	

TABLE 10.—Statement Showing Work Accomplished at Civilian Conservation Corps Camps Under the Jurisdiction of the National Park Service, July 1, 1937, to June 30, 1938—Continued

Item	Unit	Total work accomplished July 1, 1937-June 30, 1938			
		New construction		Maintenance	
		National parks and monuments	State parks	Combined total national parks and State parks	National parks and monuments
Water control structures other than dams.....	Number.....	20	185	205	3
Field planting or seeding (trees).....	Acres.....	4,406.8	8,684.4	13,091.2	3,896
Forest stand improvement.....	Acres.....	132	1,501.3	1,633.3	.....
Nurseries.....	M/days.....	16,705	42,407	59,112	6,228
Tree seed collection, conifers (cones).....	Bushels.....	191	432	623	.....
Tree seed collection, hardwoods.....	Pounds.....	1,604	9,368	10,972	.....
Collection of tree seedlings.....	Number.....	300	24,775	25,075	.....
Fighting forest fires.....	M/days.....	7,477	19,529	27,006	.....
Firebreaks.....	Miles.....	11.5	95.7	107.2	42.1
Fire hazard reduction, roadside and trailside.....	Miles.....	131.9	165.3	297.2	.....
Fire hazard reduction, other.....	Acres.....	6,273.1	13,036	19,309.1	.....
Fire presuppression.....	M/days.....	36,474	60,573	97,047	.....
Fire prevention.....	M/days.....	778	1,027	1,805	.....
Tree and plant disease control.....	Acres.....	8,256.5	13,596.6	21,853.1	1,200
Tree insect pest control.....	Acres.....	26,230.8	51,402	77,632.8	8,660
Beach improvement.....	Acres.....	190.8	81.9	272.7	.....
General clean-up.....	Acres.....	.....	113.5	113.5	.....
Landscaping, undifferentiated.....	Acres.....	6,586.8	10,955.6	17,542.4	5,844.6
Moving and planting trees and shrubs.....	Number.....	387,166	1,615,135	2,002,301	704,402
Parking areas and parking overlooks.....	Square yards.....	115,821	780,838	896,659	2,840
Public campground development.....	Acres.....	43.5	363.6	407.1	1,559
Public picnic ground development.....	Acres.....	20.8	356.8	377.6	225.5
Razing undesired structures and obliteration.....	M/days.....	71,625	146,138	217,763	.....
Seed collection (other than tree).....	Pounds.....	1,318	2,853	4,171	.....
Seeding or sodding.....	Acres.....	663.9	1,699.9	2,363.8	3,195.5
Soil preparation (fertilizing, etc.).....	Acres.....	353.2	960.7	1,313.9	.....
Vista or other selective cutting for effect.....	Acres.....	294.5	745.1	1,039.6	.....
Walks; concrete, gravel, ciunder, etc.....	Linear feet.....	13,544	50,329	63,873	6,075
Fish rearing ponds.....	Number.....	2	15	17	25
Food and cover plant and seeding.....	Acres.....	.....	133.6	133.6	.....
Lake and pond development.....	M/days.....	4,410	20,660	25,070	171
Stocking fish.....	Number.....	684,336	79,500	763,836	.....
Stream development (wildlife).....	Miles.....	2.1	1	2.2	.....
Other wildlife activities.....	M/days.....	3,471	8,582	12,053	68
Wildlife feeding.....	M/days.....	.....	701	701	.....
Wildlife shelters.....	Number.....	.....	164	164	.....
Education, guide and contact station work.....	M/days.....	64,213	76,821	141,034	.....
Emergency work.....	M/days.....	3,454	40,679	44,133	.....
Eradication of poisonous weeds or exotic plants.....	Acres.....	728	1,183	1,911	.....
Experimental plots.....	Number.....	7	200	207	10
Insect pest control.....	Acres.....	.....	2,150.5	2,150.5	.....
Maps and models.....	M/days.....	3,249	7,459	10,708	.....
Marking boundaries.....	Miles.....	123.3	62.5	185.8	.....
Mosquito control.....	Acres.....	18	93	111	.....
Preparation and transportation of materials.....	M/days.....	130,003	377,822	507,825	.....
Archeological reconnaissance and investigation.....	M/days.....	26,759	9,087	35,846	.....
Other reconnaissance and investigation.....	M/days.....	2,628	13,542	16,170	.....
Restoration of historic structures.....	Number.....	344	30	374	.....
Rodent and predatory animal control.....	Acres.....	.....	50	50	.....
Surveys.....	M/days.....	17,858	82,775	100,633	.....
Tree preservation.....	M/days.....	16,501	23,174	39,675	.....
Equipment, repair or construction.....	M/days.....	8,666	3,322	11,988	.....
Hydraulic research.....	M/days.....	253	282	535	.....
Warehousing.....	M/days.....	4,185	5,139	9,324	.....
Elimination of livestock and predators.....	Number.....	5,141	.....	5,141	.....
Unclassifiable.....	M/days.....	434	682	1,116	.....



UPPER: ONIONS BY THE TON HARVESTED LAST YEAR ON THE OWYHEE
RECLAMATION PROJECT IN EASTERN OREGON
LOWER: LETTUCE GROWN ON THE SALT RIVER RECLAMATION PROJECT
IN ARIZONA

BUREAU OF RECLAMATION

John C. Page, Commissioner

HOME-MAKING opportunities created by the Bureau of Reclamation through its construction were eagerly sought during the 1938 fiscal year as migration westward into the arid and semiarid region continued from other areas, particularly the Great Plains.

Comparatively few farmsteads were made available, but those which were ready attracted great attention. The construction program went forward rapidly with promise of new lands in larger amounts within 2 years. Meanwhile, large numbers of migrants in the West, seeking homes but forced to subsist on temporary employment here and there in harvests, are presenting an increasingly serious problem.

Projects now being constructed by the Bureau eventually will add approximately 2,500,000 acres to the cultivated area of the arid and semiarid States, but this work constitutes a long-term program. When completed, these new projects will make available more than 31,000 farmsteads, but, in the aggregate, this number, even if immediately available, would not be sufficient to take care of more than a part of the homeless farm families now in the West.

Gratifying results were obtained on the new land which has been settled in the last few years, in part by drought refugees.

Significant were the following developments:

For 69 farm units made available to homestead entry on the Tule Lake division of the Klamath project on September 9, 1937, more than 3,300 persons applied informally and a total of 1,280 formal applications were filed for consideration.

On the new Owyhee project almost 75,225 acres were irrigated principally in the Mitchell Butte and Dead Ox Flat divisions. Much of this is land recently placed in cultivation. Settlement and land development are keeping pace with the availability of water on the new lands. The demand to purchase private land and to file on homesteads continues very high. The 1937 crop value per acre of the lands in cultivation was \$31.25.

Settlement and development of the Riverton project continued to show good progress. Crops produced in 1937 were the best so far. At the beginning of 1938 there was an increase of 5 percent in the number of settlers and in the area in cultivation. At the close of

the fiscal year the promise was for a better than average yield. Demand for new land on the project was insistent by well-qualified home seekers. The morale of the settlers continues excellent.

Virtually all available lands have been taken since 1934 on the Vale project, where now 410 settlers are established. Diversified crops are produced on most farms, but sugar beets are rising in importance on the project. The crop results in 1937 were very good.

On two Montana projects and on two in Colorado the Farm Security Administration established settlements of drought-stricken farmers on tracts purchased from nonresident owners, loan companies, estates, and from old people. On the Sun River project 12,549 acres thus were divided into farms varying in size from 80 to 160 acres upon which complete sets of buildings were erected. One farm family was moved to each of these units. On the Milk River project about 100 new settlers were located in a similar manner. Although these drought refugees had not had previous experience in irrigation agriculture, as a rule they readily adapted themselves to the conditions on the project. Similar settlement projects were established on the Grand Valley and Uncompahgre projects in Colorado. Results obtained to date have been very satisfactory.

On several of the old operating projects there was an influx of farmers from drought-stricken areas. Where the opportunities existed, many rented farms. Some purchased land. Others sought work. Most of these refugees were in serious financial straits. Some, even though they were able to obtain possession of farms, did not have funds sufficient to obtain equipment necessary to operate them. It is a subject for deep regret that many of these farmers located themselves on lands which were not especially good. For the most part, only the poorer lands of the project were available for such unplanned resettlement.

The remedial projects which were placed in operation during the year also made good progress. In Utah on the Ogden River project, which serves an area which has been under cultivation for many years, provision of a late season water supply by completion of Pine View Dam resulted in the planting of a number of new orchards and a general improvement in the agriculture of the project land during the year. Development also proceeded on the Humboldt project in Nevada where several new crops were tried during the 1938 season. A California sugar-beet concern planted 500 acres of sugar beets on the project as a demonstration.

Although low farm prices reduced the average per acre crop revenue on Federal reclamation projects during the year, the 1937 season was generally satisfactory. On a few projects it was better than the 1936 season. On the Yuma project in Arizona the total crop value was \$3,025,035, the highest total since 1929. An increase of approxi-

mately 800 acres was recorded in the amount of land irrigated during the season and crop values increased about \$50,000. Bank deposits were up \$84,000. On the Salt River project also in Arizona, crop returns increased 3½ percent and bank deposits 6 percent over the previous year.

CONSTRUCTION PROGRAM

The construction program of the Bureau of Reclamation during the fiscal year was the largest in its history. Work was in progress on 32 projects in 12 States.

Two major dams were begun, bringing to 13 the number of storage dams and to 3 the number of diversion dams now under construction. Twenty-two additional dams have been authorized. The following dams were completed during the year: Taylor Park Dam on the Uncompahgre project in Colorado, Unity Dam on the Burnt River project in Oregon, Alamogordo Dam on the Carlsbad project in New Mexico, Anita Dam on the Huntley project in Montana, and the small Box Canyon Dam on the Rio Grande project. Diversion dams completed included the Cross Cut Dam on the Upper Snake River project in Idaho.

Work done during the year brought to a grand total of 147 the number of storage and diversion dams which have been completed by the Bureau of Reclamation since its origin in 1902. Of these, Shoshone, Arrowrock, Owyhee, and Boulder Dam, each was at the time of its completion the highest in the world. Boulder Dam, with a maximum height of 726.4 feet above the lowest point of foundation, still holds this record.

The Bureau's construction program was continued at an accelerated rate by allotments of emergency funds in addition to regular appropriations. Funds on hand from appropriations and new Public Works Administration allotments are sufficient to continue the program at an adequate and economical rate during the fiscal year 1939.

During 1938 construction was started on two new dams, the Vallecito Dam on the Pine River project in Colorado and the Deer Creek Dam on the Provo River project in Utah. The Vallecito Dam, with an embankment containing 3,200,000 cubic yards of earth and 475,000 cubic yards of cobble, rock, gravel, and riprap, will be the largest of its type constructed by the Bureau. The Deer Creek Dam will rank second, with approximately 3,000,000 cubic yards of earth and rock facing.

Within the 1938 fiscal year the Bureau constructed 326.2 miles of canals, 164.6 miles of drains, 9 tunnels with a total length of 18,545 feet, 214.7 miles of road, ½ mile of railroad, 365.3 miles of transmission lines, 104.7 miles of pipe, 4,250 canal structures, 282 bridges, 911 culverts, and 200 flumes. There were placed in dams 2,367,662 cubic

yards of concrete, 2,878,571 cubic yards of earth, and 607,415 cubic yards of rock fill; and 34,049.096 cubic yards of earth and rock were excavated. The Bureau used 4,006,594 barrels of cement.

GRAND COULEE DAM

The base of Grand Coulee Dam, 250 feet high and containing 4,541,909 cubic yards of concrete, was completed on March 21, 1938, a full year ahead of schedule.

Uninterrupted continuation of the construction of this, the most massive masonry structure ever undertaken by man, was assured by the award in February of a contract to complete the dam to its full height of 550 feet. The new contractor, Consolidated Builders, Inc., took over, on March 21, the work then in progress. The new contract was well under way by the end of the fiscal year. It includes the placing of 5,809,500 cubic yards of concrete.

The contract for the construction of the base of Grand Coulee Dam was awarded on July 16, 1934, and notice to proceed was given on September 28 of that year. About 4½ years were allowed for its completion. The contractor, with the aid, at one time, of nearly 7,000 men, moved from the dam site 17,177,042 cubic yards of overburden and of placed concrete in excess of the quantities needed to complete Boulder Dam. The earnings under this contract were \$38,172,560.

Under the new contract 4 years are allowed for completion of the dam and of the powerhouse on the western bank of the river.

While the base of Grand Coulee Dam was being completed and a start was being made on the job of raising it to its full height, excellent progress was being made during the fiscal year on engineering surveys and land classification work on the 1,200,000 acres of land to be irrigated by the project. Retracement surveys were completed on 891,212 acres and topography charts were completed on 502,538 acres. An average of 135 engineers was employed at this work throughout the year. All field work on land classification of 228,395 acres had been completed by the end of the year.

CENTRAL VALLEY PROJECT

A beginning was made on large-scale construction on the great Central Valley project. By the close of the year work was about to commence on Shasta Dam, one of three outstanding dams in the world to be built by the Bureau of Reclamation.

This project is designed to alleviate critical water shortage and problems in three important agricultural areas of the State through the conservation of waste flood waters of California's major rivers. In size and importance the Central Valley project is without precedent among the remedial projects undertaken by the Bureau of Reclamation.

Since completion of the project requires adjustment in water flow and distribution and the acquisition of rights-of-way in large and highly improved irrigated areas, many complex legal problems have been encountered. Much progress was made during the fiscal year toward the solution of these problems, and at the close of the year final settlement on several seemed imminent.

Through regulation of both the Sacramento and the San Joaquin Rivers the Central Valley project will provide adequate water to supplement the irrigation supply of a large area of highly improved orchard and farm lands in the southern San Joaquin Valley; reestablish navigation to Red Bluff on the Sacramento River; prevent salt water intrusion in the irrigation channels of the delta of the Sacramento-San Joaquin Rivers; provide supplemental water for irrigation, domestic and industrial uses in the Walnut Creek-Martinez area, south of Suisun Bay; and make possible the generation of 350,000 kilowatts of water power at Shasta Dam.

Camps to house employees of the Government during the construction of Friant and Shasta Dams were completed and by the end of the fiscal year work on the first 4-mile section of the Contra Costa Canal was nearing completion. Work was in progress on a 1,600-foot tunnel at Shasta Dam site which is to be used temporarily to divert the Southern Pacific Railroad past the dam site and later to divert the flow of the Sacramento River as Shasta Dam is being built.

Near the end of the fiscal year several important contracts were awarded on other units of the Contra Costa Canal and bids were called for the construction of Shasta Dam.

Shasta Dam, on the Sacramento River about 14 miles north of Redding, will be 560 feet in height, the second highest in the world. It will be 3,500 feet in length along the crest and will contain a volume of 5,610,000 cubic yards of concrete, the second most massive concrete dam in the world. The reservoir to be created by Shasta Dam in the Sacramento, Pit, and McCloud Rivers will have a capacity of 4,500,000 acre-feet of water.

On June 1, two bids were received by the Bureau at its Sacramento office on invitations to contractors to submit proposals for the construction of this giant structure. The lower bid was that of the Pacific Constructors, Inc., of Los Angeles, Calif., a firm made up of 12 large contractors.

This bid, in the amount of \$35,939,450, was being considered at the end of the fiscal year. Bids also were called in June for the construction of the Sacramento River bridge, first crossing, for the relocated Southern Pacific Railroad. The railroad must be moved from the Shasta Reservoir area and relocated on higher ground. The Denver office was engaged in the preparation of plans and specifications for 30

miles of railroad relocation and 7 bridges between Redding and Delta, Calif.

BOULDER CANYON PROJECT

Construction at Boulder Dam during the year consisted of the erection of machinery and installation of electrical fixtures with an average of about 500 men employed. Main generating units N-5 and N-6 were being installed, with N-5 ready for final tests at the end of the year. Lake Mead, on June 30, contained 22,500,000 acre-feet of water and was 114 miles long.

Rapid progress was made on the All-American Canal system. All sections of the main canal and all important structures were either completed or under construction at the end of the year. Excavation of 43 miles of the 130-mile Coachella branch canal was advertised and bids were opened at Yuma, Ariz., on June 3. The low bid indicated a cost of \$0.0424 per cubic yard for 9,030,000 cubic yards of earth excavation.

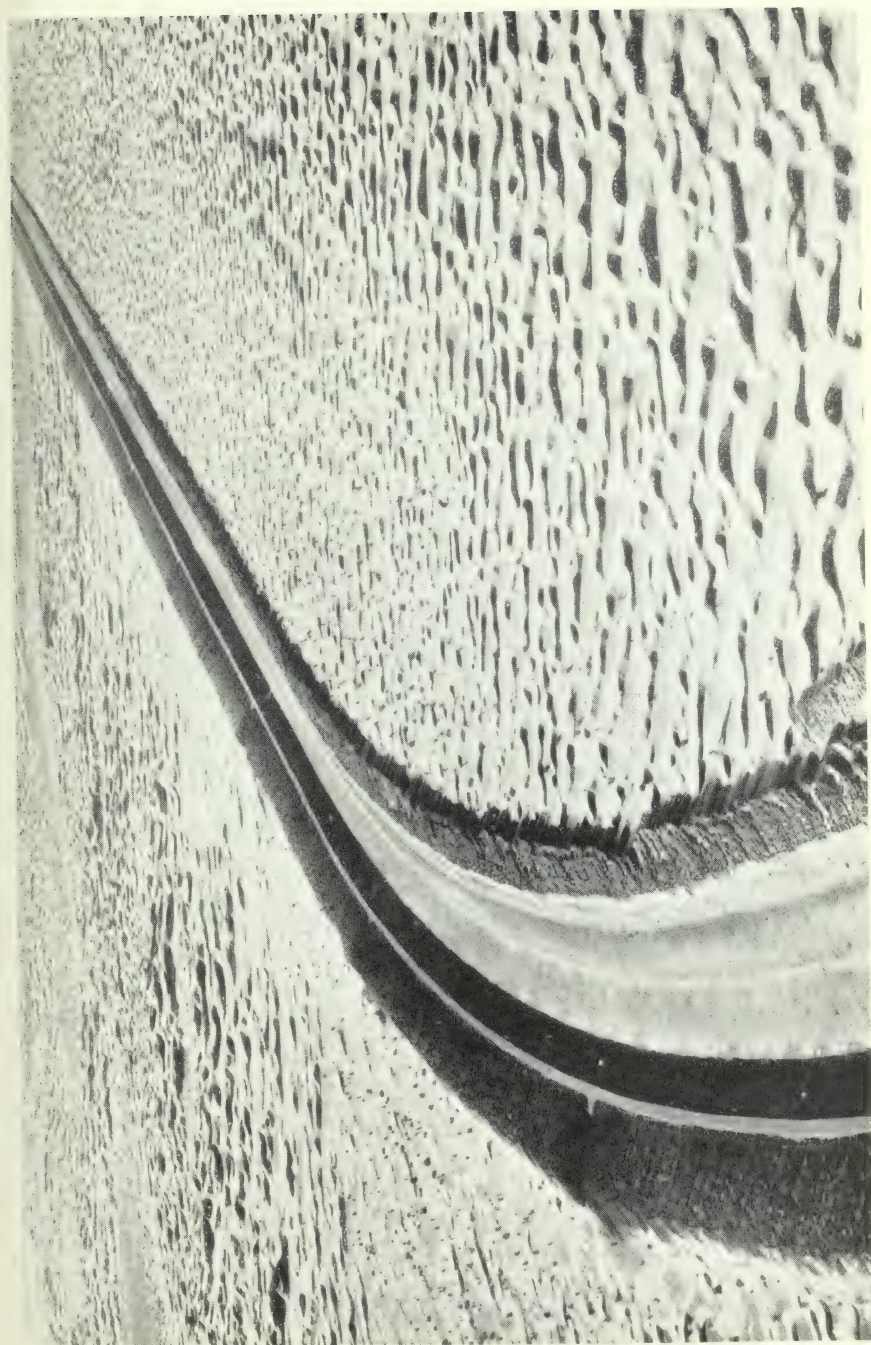
Imperial Dam and desilting works at the head of the All-American Canal on the Colorado River were virtually completed, the last concrete being placed June 6.

The All-American Canal is by far the largest irrigation ditch in the United States. It is 80 miles long and has an initial capacity of 15,000 cubic feet of water per second. The maximum section has a width of 232 feet at the water surface and a bottom width of 162 feet, with a water depth of 21 feet. Power will be developed on the canal by the Imperial Irrigation District at four points. Earth excavation amounted to approximately 65,000,000 cubic yards. The Coachella branch will have a capacity of 2,300 second-feet. Imperial Dam, of the slab and buttress type, has a crest length of 3,475 feet and is 45 feet in height. The desilting works consist of 3 double basins, each 500 by 800 feet and each containing 24 motor-driven, rotating scrapers which will assist in removing the silt. At the Arizona end of Imperial Dam are located the headworks for Gila Valley Canal of the new Gila project.

COLORADO-BIG THOMPSON PROJECT

On December 21, 1937, the President approved a finding by the Secretary that the Colorado-Big Thompson project was feasible. Previously, Congress had appropriated \$900,000 to commence construction of this project.

The project is designed to supply supplemental water for 615,000 acres of land on the eastern slope of the Continental Divide in north-eastern Colorado. More than 300,000 acre-feet of water annually will be carried from the headwaters of the Colorado River on the western slope through a tunnel 13.1 miles long to the South Platte



CALIFORNIA'S NEW RIVER; THE ALL-AMERICAN CANAL NEARING COMPLETION BY THE BUREAU OF RECLAMATION.

drainage area. Virtually all the lands to be served by the project are at present farmed by irrigation.

The tunnel, known as the Continental Divide Tunnel, is the major engineering feature of the project. It will be horseshoe shaped, 9½ feet in diameter, and will cost an estimated \$7,271,000. Other construction will include storage reservoirs, diversion dams, canals, tunnels, six power plants with an installed capacity of 142,500 kilowatts, pumping plants, and 146 miles of transmission lines. The first work to be undertaken will be the construction of Green Mountain Dam, a 270-foot earth-fill structure about 10 miles above the mouth of Blue River.

Green Mountain Reservoir will have a capacity of 152,000 acre-feet and will provide replacement storage for western-slope water users. The total cost of the project is estimated at \$44,000,000.

At the close of the fiscal year negotiation of a contract was being completed between the United States and the Northern Colorado Water Conservancy District by which the district would undertake repayment of the project costs chargeable to irrigation. At the same time the Denver office of the Bureau of Reclamation was drafting plans for the commencement of construction of Green Mountain Dam and power plant, the Continental Divide Tunnel, and construction camps at Estes Park and at other points in the project area.

OTHER CONSTRUCTION

Other important dams under construction during the fiscal year were the following: Marshall Ford Dam, 190-foot, concrete, straight gravity type, on the Colorado River of Texas project; Bartlett Dam, 270-foot, concrete multiple-arch type, on the Salt River project, Arizona; Parker Dam, 340-foot, concrete-arch type, on the Colorado River, near Parker, Ariz.; Imperial Dam, 45-foot, slab and buttress type, a part of the All-American Canal system, Boulder Canyon project, California; Vallecito Dam, 150-foot, earth-fill type, on the Pine River project, Colorado; Island Park Dam, 85-foot, earth-fill type, and Grassy Lake Dam, 120-foot earth-fill type, on the Upper Snake River storage project, Idaho; Boca Dam, 110-foot, earth-fill type, on the Truckee River storage project, Nevada-California; Moon Lake Dam, 110-foot, earth-fill type, on the Moon Lake project, Utah; Seminoe Dam, 260-foot, concrete arch, on the Kendrick project, Wyoming; and Bull Lake Dam, 75-foot, earth-fill type, on the Riverton project, Wyoming.

In April a contract was awarded to the Rohl-Connolly Co., of Los Angeles, Calif., to build the 150-foot Deer Creek Dam on the Provo River project in Utah at its bid of \$2,189,096.50.

Construction was in progress during the year on the Casper Canal, Kendrick project, with Government forces; and by contract on canals

of the Heart Mountain division of the Shoshone project, Wyoming; the Payette division of the Boise project, Idaho; and the Roza division of the Yakima project, Washington.

CUMULATIVE CONSTRUCTION RESULTS

In the 36 years the following construction has been completed by the Bureau of Reclamation: 147 storage and diversion dams; 47 powerhouses; 2,512 buildings; 19,606.4 miles of canals, ditches, and drains; 75.8 miles of tunnels; 4,500.3 miles of telephone lines; 281.6 miles of dikes; 6,241 flumes; 19,605 culverts; 13,448 bridges; 187,214 other irrigation structures.

Reservoirs of the Bureau of Reclamation now have a combined capacity of 45,522,970 acre-feet of water.

POWER

Twenty-four power plants were operated on 13 Federal reclamation projects during the 1938 fiscal year. Their total output was 2,457,-644,625 kilowatt-hours of energy.

The fifth of the great generators at Boulder Dam began operating near the close of the year; the sixth was being installed; and two more were being manufactured. With one smaller unit, two station service units, and the five big generators in operation, a total of 1,452,285,000 kilowatt-hours of electric energy were produced at Boulder Dam. Of this amount, 1,427,928,442 kilowatt-hours were sold for a gross revenue of \$1,888,132.84.

Gross sales of energy from all project plants totaled \$6,377,961.33. Some of the plants are operated and controlled by water users' organizations.

Projects under construction which contemplate power developments include the Grand Coulee Dam-Columbia Basin project in Washington, the Central Valley project in California, and the Kendrick project in Wyoming. Projects with power features which are authorized, but upon which construction had not been begun at the close of the year, include the Colorado-Big Thompson project in Colorado and the Elephant Butte power plant in New Mexico.

Generators and other electrical equipment for the Seminole plant and transmission lines of the Kendrick project were being manufactured, and power sales contracts were being negotiated.

RECLAMATION FUND

The serious situation with respect to the reclamation fund, noted in previous reports, was to a great degree alleviated for the immediate future during the fiscal year by enactment of legislation providing new revenues for the fund.

The Hayden-O'Mahoney amendment to the departmental appropriation bill provided seriously needed, immediate support for the fund, as well as a new source of accretion for the future which will, in large measure, replace in the scheme of financing the reclamation program the all but vanished accretions from the sale of public land.

This legislation provided that 52½ percent of the moneys collected up to June 30, 1938, on royalties from the naval petroleum reserves should be deposited in the reclamation fund. Of the total sum involved, however, \$15,000,000 was to be retained in the General Treasury to cancel a loan in that amount previously made to the reclamation fund. This provision relieved the special fund of a drain of \$2,000,000 per annum during the next few years. Although no accounting had been made at the end of the fiscal year, it was anticipated that, in addition to retiring the loan, approximately \$15,000,000 would be received into the reclamation fund.

Accretions to Reclamation Fund, by States

State	Sale of public lands		Proceeds from Oil Leasing Act		Total to June 30, 1938
	Fiscal year 1938	To June 30, 1938	Fiscal year 1938	To June 30, 1938	
Alabama.....			\$3,426.09	\$185,410.55	\$185,410.55
Arizona.....				160.20	2,705,487.61
California.....	\$18,828.66	\$2,705,327.41	1,733,882.78	15,822,947.68	24,027,997.41
Colorado.....	19,413.69	8,205,050.33	71,196.79	707,202.22	10,990,505.18
Idaho.....	10,079.30	10,283,302.96	1,388.29	20,776.52	7,039,699.90
Kansas.....	8,155.26	7,018,923.38	21.00	21.00	1,033,197.73
Louisiana.....	109.13	1,033,176.73	122,792.63	196,054.29	196,054.29
Mississippi.....			11.55	11.55	11.55
Montana.....	16,258.75	15,359,087.09	59,633.39	1,255,754.99	16,614,842.08
Nebraska.....	122.56	2,094,431.14			2,094,431.14
Nevada.....	3,166.58	1,026,246.68	84.00	5,531.37	1,031,778.05
New Mexico.....	20,890.82	6,682,433.77	370,360.71	1,354,592.13	8,037,025.90
North Dakota.....	552.89	12,219,211.66	16,497.76	169,219.54	12,388,431.20
Oklahoma.....	141.52	5,929,544.58			5,929,544.58
Oregon.....	8,502.90	11,980,833.16	176.54	186.82	11,981,019.98
South Dakota.....	1,796.12	7,733,413.02	294.70	2,143.96	7,735,556.98
Utah.....	9,976.23	4,249,278.82	83,418.97	617,145.33	4,866,424.15
Washington.....	3,806.89	7,450,872.68		33,749.63	7,484,622.31
Wyoming.....	20,875.14	8,665,490.94	890,681.62	35,264,961.81	43,930,452.75
Total.....	142,676.44	112,636,624.35	3,353,866.82	55,635,868.99	168,272,493.34
Proceeds, Federal water power licenses.....					1,780,266.97
Proceeds, potassium royalties and rentals.....					2,410,955.26
Grand total.....					169,463,715.57

¹ Proceeds for fiscal year, \$20,533.60.

² Proceeds for fiscal year, \$82,601.47.

A second provision of the amendment, one of far greater importance to the future of the reclamation program, directed that repayments made by water and power users on projects financed from emergency fund allotments and general fund appropriations should be deposited in the reclamation fund until such time as the cost of the project has been returned; the net power receipts then should go to the General Treasury.

Eventually, as repayments are completed over long periods on the several projects, most of them at present still under construction, upon

which allotments and general funds have been and are being expended, it may be expected that \$350,000,000, or more, will have accrued to the reclamation revolving fund. Accruals from this source are not expected to be large in the near future, since the projects from which they will be received have been only recently completed and have not begun repayment, or they are not as yet completed. Within a decade, however, several millions of dollars a year should be added to the reclamation fund as a result of this legislation.

REPAYMENTS

The Repayment Commission created by the Act of August 21, 1937, recommended and the Secretary approved postponement of repayments due during the fiscal year to a total of \$300,331. Relief was granted in this manner to 10 different projects or units of projects. The Repayment Commission recommended this relief after investigating the condition of all Federal reclamation projects now in operation. Generally, upon the recommendation of the Commission, these payments were postponed until the conclusion of the repayment contracts with the water users. Postponed payments represented roughly 10 percent of the moneys due from water users during the year.

Construction payments during the year totaled \$2,299,689; operation and maintenance collections amounted to \$1,256,689.27; while water rental payments totaled \$363,961.53. Arrearages at the close of the fiscal year were as follows: Construction \$1,169,488.16; operation and maintenance \$179,224.51; and water rental \$85,176.62.

Delinquencies were exceptionally high on a few projects. In some instances, this was true apparently because directors of irrigation districts, anticipating relief which was not received as a result of the Repayment Commission's investigations, neglected to levy charges upon the water users sufficient to yield the funds necessary to meet their full contract obligations. On many projects the water users paid substantially all due from them. The arrearages include a few comparatively large accounts which apparently never can be collected, and these should be adjusted by corrective legislation.

Half the construction repayments due the previous year had been postponed by a special act of the Congress, and previously, for several years, full moratoria had been granted. It is to be hoped that, as a result of the studies and recommendations of the Repayment Commission, legislation can be enacted to provide a more flexible and equitable method of levying the construction repayments. Contracts requiring flat-rate installments annually, making no allowances for fluctuating farm income, must be lenient or cruelly demanding, according to changing economic conditions from year to year.

Status of Reclamation Fund

Accretions to the fund:

Sales of public lands	\$112, 636, 624. 35
Royalties and rental under Mineral Leasing Act	55, 635, 868. 99
Potassium royalties and rentals	410, 955. 26
Federal water-power licenses	780, 266. 97
Total accretions	\$169, 463, 715. 57
Loan from General Treasury	15, 000, 000. 00
Collections—construction and operation and maintenance re- payments, water rents, power and light, etc	119, 569, 552. 35
Total cash available	304, 033, 267. 92
Disbursements	291, 080, 942. 23
Balance in fund June 30, 1938	12, 952, 325. 69

Accounts Receivable, Construction Water-right Charges

State and project	Due		Collected			Uncollected June 30, 1938
	Fiscal year 1938	To June 30, 1938	Cash		Other credits to June 30, 1938	
			Fiscal year 1938	To June 30, 1938		
Arizona:						
Salt River	\$217, 796. 90	\$7, 181, 521. 91	\$217, 796. 90	\$7, 181, 521. 91	-----	-----
Yuma Auxiliary	15, 727. 82	578, 912. 37	14, 648. 21	577, 668. 66	\$732. 73	\$510. 98
Arizona-California: Yuma	282, 319. 32	4, 269, 644. 91	197, 883. 83	3, 562, 591. 42	652, 406. 39	54, 647. 10
California: Orland	491. 68	827, 017. 87	12, 817. 86	800, 743. 57	-----	26, 274. 30
Colorado:						
Grand Valley	55, 480. 27	253, 263. 21	25, 169. 62	115, 899. 56	137, 363. 65	-----
Uncompahgre	53, 262. 58	597, 084. 64	28, 501. 81	463, 909. 24	64, 558. 10	68, 617. 30
Idaho:						
Boise	304, 667. 97	4, 342, 457. 07	291, 543. 90	4, 299, 961. 46	27, 193. 29	15, 302. 32
Minidoka	295, 669. 12	8, 546, 349. 27	224, 646. 39	7, 529, 560. 50	921, 485. 95	95, 302. 82
Montana:						
Bitter Root	36, 122. 26	72, 244. 52	18, 025. 42	36, 050. 84	-----	36, 193. 68
Huntley	17, 344. 07	589, 090. 93	14, 435. 36	492, 375. 50	95, 924. 67	790. 76
Milk River	30, 153. 15	127, 910. 88	14, 045. 61	26, 912. 86	-----	100, 998. 02
Sun River	32, 429. 56	312, 020. 90	32, 467. 71	268, 439. 02	40, 278. 49	3, 313. 39
Montana-North Dakota:						
Lower Yellowstone	73, 229. 29	392, 750. 60	46, 402. 15	363, 562. 66	1, 546. 39	27, 641. 55
Nebraska-Wyoming:						
North Platte	261, 235. 45	4, 532, 129. 60	121, 977. 74	2, 934, 169. 80	1, 518, 524. 56	79, 435. 24
Nevada: Newlands	51, 022. 55	1, 286, 113. 13	49, 581. 69	1, 202, 575. 74	79, 525. 90	4, 011. 49
New Mexico: Carlsbad	15, 699. 27	903, 117. 37	4, 308. 57	891, 645. 42	81. 25	11, 390. 70
New Mexico-Texas: Rio Grande	290, 652. 72	3, 498, 602. 17	201, 545. 10	3, 079, 564. 93	419, 037. 24	-----
Oregon:						
Baker	5, 769. 50	8, 654. 25	5, 769. 50	8, 654. 25	-----	-----
Umatilla	88, 345. 20	634, 387. 74	3, 960. 06	408, 650. 91	5, 573. 09	220, 163. 74
Oregon-California: Klamath	70, 216. 83	1, 265, 965. 72	61, 919. 98	1, 223, 831. 19	6, 367. 47	35, 767. 06
South Dakota: Belle Fourche	14, 029. 58	698, 121. 11	19, 701. 27	570, 519. 79	81, 998. 17	45, 693. 15
Utah:						
Salt Lake Basin	143, 498. 73	216, 470. 59	143, 498. 73	216, 470. 59	-----	-----
Strawberry Valley	86, 463. 50	1, 472, 401. 85	85, 663. 50	1, 460, 013. 63	12, 388. 22	-----
Washington:						
Okanogan	5, 425. 94	148, 327. 74	425. 94	138, 327. 74	-----	10, 000. 00
Yakima	458, 932. 71	7, 391, 907. 11	209, 170. 54	6, 972, 085. 20	86, 668. 41	333, 153. 50
Wyoming: Shoshone	46, 746. 67	1, 053, 581. 70	45, 705. 58	888, 625. 14	164, 675. 50	281. 06
Total	2, 531, 277. 00	51, 200, 059. 16	2, 072, 316. 55	45, 714, 331. 53	2, 316, 239. 47	1, 169, 488. 16
Paid in advance of due dates	-----	-----	1213, 064. 61	397, 600. 83	3236, 748. 60	-----
Refunds	-----	-----	1, 298. 50	100, 225. 10	3, 212. 84	-----
Total collections	-----	-----	1, 860, 550. 44	46, 212, 157. 46	-----	-----
Contributed funds applying to construction cost not included in above table	-----	-----	50, 272. 70	1, 866, 795. 10	-----	-----

¹ Contra.² Other credits for fiscal year, \$396,242.³ Increase for fiscal year, \$48,162.67.

Accounts Receivable, Operation and Maintenance Charges (After Public Notice)

State and project	Due		Collected			Uncollected June 30, 1938
	Fiscal year 1938	To June 30, 1938	Cash		Other credits to June 30, 1938	
			Fiscal year 1938	To June 30, 1938		
Arizona: Yuma Auxiliary	\$18,329.56	\$517,590.24	\$16,845.09	\$501,156.14	\$12,952.34	\$3,481.76
Arizona-California: Yuma	154,843.50	4,154,666.23	147,908.66	3,960,920.66	188,757.67	4,987.90
California: Orland	30,059.66	710,989.01	38,247.45	669,034.15	25,757.82	16,197.04
Colorado:						
Grand Valley	49,947.60	507,031.57	49,947.60	474,031.57	33,000.00	
Uncompahgre		1,008,683.69		977,809.79	30,873.90	
Idaho:						
Boise	8,702.78	2,210,352.80	8,702.78	2,157,703.08	52,649.72	
King Hill		60,711.27		59,192.22	1,519.05	
Minidoka	69,732.25	2,273,620.94	63,895.25	2,126,474.88	141,590.86	5,555.20
Montana:						
Frenchtown	12,000.00					
Huntley		554,787.34		543,594.31	11,193.03	
Milk River	53,546.83	472,464.80	52,570.49	446,169.45	1,662.25	24,633.10
Sun River		168,718.50		164,366.28	4,352.22	
Montana-North Dakota:						
Lower Yellowstone		338,562.56		338,557.93	4.63	
Nebraska-Wyoming: North Platte	23,149.11	1,975,780.18	21,666.38	1,901,350.60	65,336.20	9,093.38
Nevada: Newlands		1,174,581.57		1,135,901.55	38,680.02	
New Mexico: Carlsbad	30,853.83	1,029,055.68	30,853.83	1,012,182.97	16,872.71	
New Mexico-Texas: Rio Grande	305,844.66	4,947,401.19	347,680.01	4,686,230.38	261,170.81	
North Dakota:						
Buford-Trenton		2,317.41		2,317.41		
Williston		34,042.75		34,042.75		
Oregon:						
Umatilla	3,269.80	395,348.20	3,961.93	388,094.24	7,253.96	
Vale	22,206.89	60,356.56	22,206.89	60,356.56		
Oregon-California: Klamath	63,630.79	1,437,141.29	63,532.84	1,402,406.46	30,536.22	4,198.61
Oregon-Idaho: Owyhee	20,051.79	50,869.88	20,051.79	50,869.88		
South Dakota: Belle Fourche	71,255.05	1,323,916.85	71,255.05	1,314,540.86	9,375.99	
Utah: Strawberry Valley		376,880.88		365,022.21	11,858.67	
Washington:						
Okanogan		371,441.72		368,788.67	2,653.05	
Yakima	228,110.38	6,058,325.35	218,971.01	5,876,965.37	71,828.09	109,531.89
Wyoming: Shoshone	3,123.03	561,250.87	2,790.12	535,999.81	23,705.43	1,545.63
Total	1,154,657.51	32,776,889.33	1,181,087.17	31,554,080.18	² 1,043,584.64	179,224.51
Paid in advance of due dates			42,730.55	193,478.57	³ 10,982.82	
Penalties and interest			8,291.09	536,064.71	20,480.00	
Refunds			12.60	38,241.47	156.00	
Total collections			1,232,121.41	32,321,864.93		

¹ Contra.² Other credits for fiscal year, \$24,024.27.³ Increase for fiscal year, \$10,659.41.

Accounts Receivable, Rentals of Irrigation Water

State and project	Due		Collected			Uncollected June 30, 1938
	Fiscal year 1938	To June 30, 1938	Cash		Other credits to June 30, 1938	
			Fiscal year 1938	To June 30, 1938		
Arizona:						
Salt River.....		\$2, 246, 726. 01		\$2, 246, 726. 01		
Yuma auxiliary.....	\$1, 147. 20	14, 984. 03	\$1, 147. 20	14, 984. 03		
Arizona-California: Yuma.....	10, 320. 78	576, 977. 03	10, 223. 29	563, 829. 84	\$12, 654. 19	\$493. 00
California: Orland.....		121, 489. 73		121, 489. 73		
Colorado:						
Grand Valley.....	10, 897. 60	544, 623. 46	13, 385. 86	538, 122. 79	6, 500. 67	
Uncompahgre.....	4, 926. 49	1, 234, 243. 85	1, 361. 60	1, 222, 661. 96		11, 581. 89
Idaho:						
Boise.....	8, 050. 00	822, 138. 57	8, 050. 00	817, 418. 07	4, 720. 50	
Minidoka.....	58, 078. 98	855, 683. 58	58, 034. 78	852, 231. 37	3, 383. 01	69. 20
Montana:						
Huntley.....	655. 00	13, 612. 48	655. 00	13, 612. 48		
Milk River.....	475. 63	238, 962. 88	475. 63	228, 616. 10	1, 208. 14	9, 138. 64
Sun River.....		132, 656. 90		130, 702. 92	1, 366. 62	587. 36
Montana-North Dakota: Lower Yellowstone.....	505. 80	137, 647. 40	599. 40	136, 952. 78		694. 62
Nebraska-Wyoming: North Platte.....	1, 104. 50	349, 864. 47	1, 113. 50	349, 854. 47	10. 00	
Nevada: Newlands.....		28, 291. 16		22, 114. 31	6, 176. 85	
New Mexico:						
Carlsbad.....		40, 741. 28	72. 00	40, 741. 28		
Hondo.....		9, 129. 70		9, 129. 70		
New Mexico-Texas: Rio Grande.....	86, 459. 44	1, 606, 872. 96	87, 784. 44	1, 586, 115. 40		20, 757. 56
North Dakota:						
Buford-Trenton.....		31. 75		31. 75		
Williston.....		2, 117. 28		2, 117. 28		
Oregon:						
Umatilla.....	2, 586. 45	102, 729. 77	2, 586. 45	76, 452. 97		26, 276. 80
Vale.....	17. 10	21, 561. 55	67. 10	21, 358. 72		202. 83
Oregon-California: Klamath.....	55, 953. 39	507, 214. 84	55, 447. 80	502, 430. 59	25. 00	4, 759. 25
Oregon-Idaho: Owyhee.....	75, 166. 56	137, 686. 42	65, 937. 99	127, 914. 39		9, 772. 03
South Dakota: Belle Fourche.....	493. 06	11, 435. 74	493. 06	11, 417. 94	17. 80	
Utah: Strawberry Valley.....		17, 596. 13		17, 596. 13		
Washington:						
Okanogan.....		110, 645. 28		108, 061. 09	2, 584. 19	
Yakima.....	45, 027. 17	225, 106. 49	2, 532. 85	181, 982. 27	4, 082. 69	39, 041. 53
Wyoming:						
Riverton.....	35, 596. 90	130, 806. 53	34, 435. 75	120, 138. 26	10, 455. 31	212. 96
Shoshone.....	14, 015. 26	123, 528. 21	14, 010. 32	119, 652. 34	3, 800. 97	74. 90
Total.....	411, 477. 31	10, 365, 105. 48	358, 430. 90	10, 184, 456. 97	56, 985. 94	123, 662. 57

¹ Other credits for fiscal year, \$5,517.51.

POPULATION OF THE PROJECTS

The total population of Federal reclamation projects at the close of the year was 873,500 persons. Of this total, 222,681 persons lived on 51,834 farms which were provided water by irrigation systems of the Bureau of Reclamation and 650,826 lived in 254 towns and cities established in these irrigated areas.

These communities created by construction of the projects were served by 863 schools and 1,076 churches. In the project areas was a total of 106 banks with deposits amounting to \$190,820,316.

Settlement and Economic Data, 1938

State	Project	Irrigated farms		Towns		Number of schools	Number of churches	Bank deposits
		Number	Population	Number	Population			
Arizona.....	Salt River.....	9,000	67,600	12	95,400	91	152	\$57,580,000
Arizona-California.....	Yuma.....	1,666	3,375	5	8,700	13	27	1,575,335
California.....	Orland.....	673	1,964	1	1,200	9	10	1,053,881
Colorado.....	Grand Valley.....	521	1,496	6	18,950	17	38	4,069,072
Idaho.....	Uncompahgre.....	1,617	5,922	3	8,350	28	35	3,818,892
	Boise.....	4,020	15,705	16	50,500	58	88	(¹)
	Minidoka.....	3,429	11,066	6	7,825	22	52	(¹)
Montana.....	Bitter Root.....	325	1,111	6	4,300	18	13	1,658,365
	Brantown.....	34	120	3	17,150	15	23	8,764,093
	Humley.....	631	2,460	5	774	8	6	158,759
	Milk River.....	650	2,427	17	11,552	32	36	4,572,417
Montana-North Dakota.....	Sun River.....	775	1,841	6	821	10	11	344,791
	Lower Yellowstone.....	605	2,760	7	4,055	18	22	1,090,545
	North Platte.....	2,820	9,276	17	22,352	70	54	7,074,961
Nebraska-Wyoming.....	Humboldt.....	56	150	1	1,200	4	4	834,450
	Newlands.....	741	2,985	4	2,200	16	12	820,000
	Truckee River Storage.....	300	1,650	2	28,000	24	15	16,103,000
New Mexico.....	Carlsbad.....	461	2,010	4	8,000	9	12	1,701,188
New Mexico-Texas.....	Rio Grande.....	5,423	26,514	36	133,012	88	128	33,543,879
Oregon.....	Unatilla.....	1,421	1,421	5	1,585	7	10	365,000
	Vale.....	410	1,600	3	1,600	5	12	369,700
Oregon-California.....	Klamath.....	906	2,767	5	17,390	30	36	(¹)
	Owyhee.....	1,435	5,607	5	7,000	25	23	(¹)
Oregon-Idaho.....	Belle Fourche.....	900	2,372	5	3,550	28	17	2,500,000
	Hyrum.....	375	1,500	3	3,500	5	6	(²)
South Dakota.....	Moon Lake.....	600	2,550	10	4,400	17	15	300,000
	Ogden River.....	1,230	4,900	4	53,960	25	55	12,000,000
Utah.....	Sanpete.....	210	1,160	2	1,950	5	4	980,000
	Strawberry Valley.....	2,200	5,550	12	25,000	27	26	1,163,300
Washington.....	Weber River.....	2,100	10,000	10	48,000	46	50	20,000,000
	Okanogan.....	401	961	3	4,700	9	8	1,067,052
Wyoming.....	Yakima.....	5,543	18,040	23	50,268	78	62	6,360,574
	Riverton.....	368	1,320	2	1,150	2	4	(²)
	Shoshone.....	979	2,801	5	3,052	3	10	544,762
Total, 1938.....		51,834	222,681	254	650,826	863	1,076	190,820,316

* Data is not available.

¹ Branch banks. Information not available.² No banks on project or in project towns.

OPERATION AND MAINTENANCE

Since 1902 the Bureau of Reclamation has completed in 16 arid and semiarid States 35 separate irrigation projects. Fourteen of these projects are operated and maintained by the Bureau. The operation of the remainder has been transferred to local, legally organized irrigation districts or water users' associations. These are operated in accordance with rules and regulations approved or prescribed by the Secretary and in conformity with contracts under which the transfers were made. Contracts, involving operation and maintenance and other related matters, are in effect between the United States and about 100 such water users' organizations.

It is essential that the Bureau maintain close contact with activities and problems on all its operating projects. In addition to supervision of the routine operation and maintenance of dams, reservoirs, canals, and other features which remain the property of the United States and which make up the irrigation systems of the numerous projects, there are many other matters which require the attention of the Bureau. Matters which have a direct influence upon the social and economic success of the projects, upon the ability of the water users to meet repayment installments to the United States, or upon reclamation as a national policy fall into this class.

The necessity for attention to and for expansion of the functions of the Operation and Maintenance Division was emphasized in the report of the Repayment Commission, submitted during the fiscal year, under authority of the act of August 21, 1937.

With the organization of the division 3 years ago, the Bureau assumed a more vigorous role in the solution of project problems. During the 1938 fiscal year, the Operation and Maintenance Division instituted educational programs in attacking two of the most troublesome problems—the eradication or control of noxious weeds, and introduction of more efficient methods of use of water and of irrigated soils.

In cooperation with water users' organizations and other local agencies, with State colleges and with county agricultural agents, well-planned illustrated lectures, field-study groups, and demonstration projects were made available to, and were well received by, virtually all water users on Federal reclamation projects in connection with these two matters.

In many localities on Federal projects, especially where lands have been in cultivation for many years, wasteful irrigation methods are still employed. On farms in some project areas lands are not properly prepared, and farm ditches are not properly designed and located for optimum crop results. In some localities overirrigation is a fault. Water in excess of that required by the crops grown is applied to the

point where lands are seeped, eroded, or where harmful salts accumulate.

A vigorous program has been instituted in an effort to introduce more up-to-date, practical, and efficient methods. Strawberry clover has been introduced and is proving valuable as a means of making alkaline and seeped soils useful.

Noxious weeds menace farms on many projects. A vigorous attack upon the weed problem has resulted in the institution on several projects of well thought-out weed eradication programs which are most promising. In several areas weed districts have been organized under State control. In others project control boards have taken an active part in sponsoring and carrying forward weed eradication programs. A great number of farmers, informed of the danger from, and of practical methods for control of, noxious weeds, are cleaning up their places.

One important feature of the work of the Operation and Maintenance Division has been informing the water users of practical equipment, which can be manufactured cheaply by the project farmer at home and from materials at hand, for such work as leveling lands; throwing up the low dikes needed for the border method of irrigation; making the corrugations necessary for handling water on steeper fields; eradicating deep-rooted weeds, and testing water penetration in irrigated soils.

CROP RESULTS

Good crops were general on Federal reclamation projects during the 1937 irrigation season, although lower prices offset increased yield. The irrigable area increased 72,795 acres; the irrigated area increased 76,614 acres; and the crop area increased 132,850 acres. The grand total of crop values amounted to \$118,658,272, bringing to \$2,430,-441,514 the cumulative total since the first project began operating in 1906. Except for the 1936 season, this was the best since 1930.

The average per acre crop value on 1,700,969 acres within project boundaries was \$42.85 and that on 1,333,800 acres served with water under Warren Act contracts was \$34.31. Combined, these represented an average yield of crops valued at \$39.09 for each acre served by the irrigation systems and storage reservoirs of the Bureau. This figure, last year, was \$47.10.

With one exception projects had ample water. The snowfall of the winter and the run-off of the spring made the 1938 season one of plentiful stored water in most localities throughout the arid and semiarid region. Several reservoirs spilled for the first time in many years. At the close of the fiscal year, good crops for the ensuing season were again in prospect.

Irrigation and Crop Results on Government Projects in 1937

State	Projects and divisions	Lands on projects covered by crop census					Other lands served by Government works, usually by a partial water supply through private canals under Warren Act or other water-service contracts				
		Irrigable acreage ¹	Irrigated acreage	Area in cultivation ²	Crop value		Irrigable acreage	Irrigated acreage	Area in cultivation ²	Crop value	
					Total	Per acre				Total	Per acre
Arizona Arizona-California	Salt River	242,656	229,460	239,460	\$20,150,858	\$87.82	93,017	74,775	74,775	\$4,225,000	\$56.40
	Yuma	68,580	53,550	59,706	3,227,279	54.05					
	Valley Division	48,383	43,675	44,948	2,706,339	60.21					
	Reservation Division	7,743	3,290	7,685	32,649	12.06					
	Bard Division	6,135	3,176	3,664	226,047	33.91					
California Colorado	Yuma Auxiliary (Mesa)	6,319	1,409	1,409	202,244	143.53					
	Orland	19,867	14,650	14,650	580,330	39.61					
	Grand Valley	30,513	17,853	17,933	651,836	36.51	18,427	14,955	14,736	1,700,346	105.00
	Uncompagire	72,037	62,535	62,271	1,569,432	25.20	1,650	1,550	1,490	44,700	30.00
	Boise	175,128	150,058	150,273	4,367,817	29.11	126,929	121,300	113,743	3,154,125	28.00
Idaho	New York Irrigation District	17,532	14,937	15,152	289,097	19.35					
	Nampa - Meridian Irrigation District	40,813	35,155	35,155	920,649	26.19					
	Boise - Kuna Irrigation District	48,602	44,388	44,388	1,227,346	27.65					
	Wildor Irrigation District	59,469	47,823	47,823	1,648,252	34.47					
	Big Bend Irrigation District	1,818	1,370	1,370	35,208	25.70					
Minidoka	Black Canyon Irrigation District (Notus Div.)	6,894	6,385	6,385	247,265	38.73					
	Minidoka	180,129	163,727	163,727	5,226,458	31.92	741,710	696,276	657,741	17,618,576	26.80
	Minidoka Irrigation District	69,871	60,624	60,624	1,974,858	32.58					
	Burley Irrigation District	49,286	42,131	42,131	1,540,869	36.57					
	Gooding Division	60,972	60,972	60,972	1,710,731	28.05					

See footnotes at end of table.

Irrigation and Crop Results on Government Projects in 1937—Continued

State	Projects and divisions	Lands on projects covered by crop census						Other lands served by Government works, usually by a partial water supply through private canals under Warren Act or other water-service contracts					
		Irrigable acreage ¹	Irrigated acreage	Area in cultivation ²	Crop value		Per acre	Irrigable acreage	Irrigated acreage	Area in cultivation ²	Crop value		Per acre
					Total						Total		
Montana	Bitter Root	16,320	15,720	15,720	297,465	18.92							
	Hundley	29,501	23,591	16,768	723,869	43.23							
	Milk River	122,133	60,749	53,327	1,354,188	25.39							
	Malta Division	56,652	25,163	18,372	424,834	23.12							
	Glascow Division	21,997	7,068	7,429	92,545	12.45							
Montana-North Dakota	Chinook Division	43,484	28,518	27,526	836,809	30.40							
	Sun River	71,883	50,573	54,867	724,951	13.21							
	Fort Shaw Division	13,811	7,806	7,753	122,141	15.75							
	Greenfields Division	58,072	42,767	47,114	602,810	12.79							
	Lower Yellowstone	58,324	44,251	44,251	1,322,430	29.88							
Nebraska	District No. 1 (Montana)	38,001	30,402	30,402	901,970	29.67							
	District No. 2 (North Dakota)	20,323	13,849	13,849	420,460	30.36							
	North Platte	235,309	189,189	171,884	5,843,432	34.00		121,050	106,480	97,535	3,192,221	32.72	
	Pathfinder Irrigation District	112,959	82,186	70,040	2,168,890	30.97							
	Gering and Fort Laramie Irrigation District	54,797	51,552	50,309	2,101,078	41.76							
Nevada	Goshute Irrigation District	51,383	43,745	41,650	1,376,639	33.03							
	Northport Irrigation District	16,170	11,706	9,885	196,855	19.91							
	Newlands	66,743	50,772	49,972	945,669	18.95							
	Carlsbad	25,055	22,855	22,855	1,209,696	52.93							
	Rio Grande	153,202	145,011	142,499	10,178,953	71.43		78,000	45,100	45,100	1,905,245	42.24	
Oregon	Elephant Butte Irrigation District	90,192	81,793	78,874	5,420,450	68.72							
	El Paso County Irrigation District No. 1	69,010	63,218	63,625	4,758,503	74.79							
	Umatilla	15,393	11,335	11,335	225,378	19.89		917	806	806	20,482	25.40	
	East Division	7,813	7,038	146,242	146,242	20.78							
	West Division	7,580	4,297	4,297	79,136	18.42							
	Vale	30,000	16,458	16,458	466,097	28.26							

Oregon-California.....		61,635	51,468	50,439	2,027,919	40,20	63,672	40,309	40,309	1,076,379	26,70
Main Division.....		41,088	32,319	31,234	1,079,820	34,57					
Tule Lake Division.....		20,547	19,149	19,205	948,039	49,37					
Owyhee.....		64,148	26,377	26,377	824,239	31,25	*28,285	*21,726	*21,272	*765,260	*35,97
Advancement Irrigation District.....		837	576	576	18,279	31,73					
Bench Irrigation District.....		2,481	2,053	2,053	116,179	56,59					
Crystal Irrigation District.....		802	867	867	29,327	33,83					
Kingman Colony Irrigation District.....		1,531	1,230	1,230	48,201	39,19					
Owyhee Irrigation District.....		52,301	18,161	18,161	448,191	24,68					
Payette-Oregon Slope Irrigation District.....		6,196	3,490	3,490	164,062	47,01					
South Dakota.....		72,811	33,050	33,050	652,008	19,73					
Utah.....		8,226	5,879	5,879	199,616	33,96	86,420	84,790	84,790	3,089,099	36,84
Belle Fourche.....											
Weber River (Salt Lake Basin).....											
Hyrum.....											
Ogden River.....											
Sanpete.....											
Strawberry Valley.....		53,889	39,427	39,309	877,245	22,32					
High Line Division.....		21,856	17,924	17,806	302,332	16,97	18,262	12,620	12,553	495,302	39,19
Spanish Fork Division.....		22,033	13,374	13,374	332,065	24,82	12,755	5,890	6,280	128,926	20,53
Springville-Mapleton Division.....		10,000	8,129	8,129	242,848	29,87	7,382	7,069	7,003	175,529	25,07
Washington.....		5,289	3,461	3,461	132,820	38,37					
Yakima.....		205,833	162,279	164,343	7,234,818	44,02	172,677	155,463	155,438	8,170,631	52,56
Sunnyside Division.....		105,860	81,634	83,420	3,175,629	38,07					
Tieton Division.....		20,537	25,650	25,430	2,470,460	97,15					
Kitittas Division.....		70,186	54,995	55,493	1,588,729	28,63					
Wyoming.....		32,000	23,431	23,431	435,850	18,60	229	229	229	2,802	12,23
Riverton.....		72,576	57,724	56,644	1,442,946	25,47					
Shoshone.....		41,627	34,966	34,564	1,014,885	29,36					
Garland Division.....		20,041	13,880	13,082	219,544	16,78					
Frankie Division.....		10,808	8,998	8,998	208,567	23,18					
Willwood Division.....											
Grand total, 1937.....		2,194,830	1,725,463	1,700,969	72,893,640	42,85	1,571,382	1,389,338	1,333,800	45,764,623	34,31
Warren Act lands.....		1,571,382	1,389,338	1,333,800	43,704,623	34,31					
Grand total of projects proper and Warren Act.....		3,766,212	3,114,801	3,034,769	118,598,272	39,09					
Grand total, 1936.....		3,693,417	3,038,187	2,901,919	136,502,480	47,10					
Increase or decrease.....		+72,795	+76,614	+132,850	-17,844,208	-8,01					

+ Increase, - decrease.

1 Area for which the Bureau was prepared to supply water in 1937.

2 See interpretation of subsection F of act of Dec. 5, 1924 (43 Stat. 672), as outlined in circular letter No. 2324, Feb. 15, 1937.

* Includes the Gem Irrigation District and the Ontario-Nyssa Irrigation District.

Irrigated and Cropped Acres and Accumulated Crop Values by Years, 1906-37

Year	Federal irrigation projects				Warren Act lands				Entire area			
	Irrigated acreage	Cropped acreage	Crop value		Irrigated acreage	Cropped acreage	Crop value		Irrigated acreage	Cropped acreage	Crop value	
			For year	Cumulative total			For year	Cumulative total			For year	Cumulative total
1906	22,300	1,20,100	\$244,900	\$5,005,360	---	---	---	---	22,300	1,20,100	\$244,900	---
1907	187,628	1,169,000	4,760,460	12,641,248	---	---	---	---	187,628	1,169,000	4,760,460	\$5,005,360
1908	289,949	1,369,500	7,635,888	24,641,911	---	---	---	---	289,949	1,369,500	7,635,888	12,641,248
1909	410,628	1,969,500	11,920,663	37,506,550	---	---	---	---	410,628	1,969,500	11,920,663	24,641,911
1910	471,423	2,413,000	12,944,639	50,592,991	---	---	---	---	471,423	2,413,000	12,944,639	37,506,550
1911	562,311	2,970,000	13,086,441	66,680,125	---	---	---	---	562,311	2,970,000	13,086,441	50,592,991
1912	614,477	3,470,000	16,007,134	82,276,534	---	---	---	---	614,477	3,470,000	16,007,134	66,680,125
1913	694,142	4,037,227	15,676,409	98,752,051	---	---	---	---	694,142	4,037,227	15,676,409	82,276,534
1914	761,271	4,703,424	18,475,517	116,916,563	---	---	---	---	761,271	4,703,424	18,475,517	98,752,051
1915	810,649	5,400,035	21,328,851	149,732,475	---	---	---	---	810,649	5,400,035	21,328,851	116,916,563
1916	922,821	6,288,291	26,462,313	206,194,788	---	---	---	---	922,821	6,288,291	26,462,313	149,732,475
1917	1,026,663	7,266,784	32,815,972	273,016,184	1,501,100	1,481,600	\$35,000,000	\$99,308,408	1,026,663	7,266,784	32,815,972	176,194,788
1918	1,119,506	8,193,193	38,974,137	361,990,321	916,313	880,613	64,968,468	147,205,218	1,026,663	7,266,784	32,815,972	209,016,184
1919	1,187,255	9,153,820	44,171,650	428,161,971	981,940	939,580	47,836,750	192,043,968	1,026,663	7,266,784	32,815,972	241,832,162
1920	1,223,480	1,157,900	49,620,300	477,782,271	1,001,230	999,580	45,288,630	225,334,608	1,026,663	7,266,784	32,815,972	274,648,140
1921	1,202,130	1,160,100	50,360,850	528,143,121	983,290	951,270	33,240,840	258,575,448	1,026,663	7,266,784	32,815,972	307,464,112
1922	1,293,700	1,179,870	65,046,300	593,189,421	1,051,380	1,033,400	37,557,860	296,133,308	1,026,663	7,266,784	32,815,972	340,280,084
1923	1,290,890	1,216,610	66,488,560	659,677,981	1,030,670	1,019,170	33,237,470	329,370,778	1,026,663	7,266,784	32,815,972	373,096,056
1924	1,320,300	1,242,750	77,608,880	737,286,861	1,019,170	951,250	53,655,850	383,026,628	1,026,663	7,266,784	32,815,972	405,912,030
1925	1,411,020	1,326,810	80,309,620	817,596,481	1,097,190	1,049,580	49,750,040	432,776,668	1,026,663	7,266,784	32,815,972	438,728,002
1926	1,378,990	1,286,810	70,985,450	888,581,931	1,148,115	1,072,486	61,100,010	493,876,678	1,026,663	7,266,784	32,815,972	471,543,974
1927	1,442,080	1,385,500	80,298,800	968,880,731	1,235,020	1,192,030	62,495,320	556,372,008	1,026,663	7,266,784	32,815,972	504,359,956
1928	1,503,810	1,420,070	87,559,670	1,056,440,401	1,234,230	1,192,900	72,720,400	629,092,408	1,026,663	7,266,784	32,815,972	537,175,928
1929	1,467,097	1,407,900	64,418,940	1,120,859,341	1,285,406	1,254,493	54,654,550	683,746,958	1,026,663	7,266,784	32,815,972	569,991,900
1930	1,522,718	1,462,565	40,121,089	1,160,980,430	1,293,889	1,251,820	33,406,340	717,153,298	1,026,663	7,266,784	32,815,972	602,807,878
1931	1,580,770	1,529,903	48,138,576	1,209,118,006	1,244,461	1,196,400	38,627,219	755,780,517	1,026,663	7,266,784	32,815,972	635,623,850
1932	1,556,144	1,506,320	31,165,752	1,240,283,758	1,239,017	1,193,113	35,425,870	791,206,387	1,026,663	7,266,784	32,815,972	668,439,822
1933	1,580,770	1,529,903	48,138,576	1,288,422,334	1,285,681	1,229,594	40,160,676	831,367,064	1,026,663	7,266,784	32,815,972	701,255,796
1934	1,532,124	1,464,166	39,628,327	1,328,050,661	1,294,680	1,256,970	43,179,031	874,546,095	1,026,663	7,266,784	32,815,972	734,071,768
1935	1,640,936	1,604,166	63,601,663	1,391,652,324	1,335,995	1,272,745	57,599,662	932,145,757	1,026,663	7,266,784	32,815,972	766,887,740
1936	1,702,192	1,629,174	78,942,818	1,470,595,142	1,389,338	1,333,800	45,764,623	977,910,380	1,026,663	7,266,784	32,815,972	800,703,712
1937	1,725,463	1,700,969	72,893,649	1,543,488,791	---	---	---	---	---	---	---	---

* Estimated.

† Net area in cultivation.

Revised and corrected June 1938. Does not include acreages of lands cropped without irrigation and crop values therefrom.

SECONDARY INVESTIGATIONS

Investigations of 64 proposed projects were in progress during the fiscal year by the Bureau of Reclamation. Funds for this work were available through allotment of emergency moneys and appropriations.

California.—In addition to investigations made in connection with the Central Valley project, two proposed projects were being studied. They were surveys on the Kings River and an investigation of the Tule Lake-Lower Klamath Lake project. Work on the Kings River proposal, which includes an investigation of the feasibility of developing Pine Flat and other reservoirs for irrigation, flood control, and power, was confined principally to analysis of existing data. The study in the Tule Lake-Lower Klamath Lake area was designed to test the feasibility of pumping water from Tule Lake into Lower Klamath Lake, thus providing protection to leased lands around Tule Lake and establishing a bird refuge in Lower Klamath Lake. The report on this project was completed.

Colorado.—Four major investigational programs were in progress in Colorado. They were the western slope surveys; the eastern slope surveys; the Blue River-South Platte diversion proposal, and the Colorado River surveys, which were authorized under the Boulder Canyon Project Act.

In connection with western slope surveys, three reports were completed. The reports covered the Mancos project, which would supplement the water supply of 7,000 to 10,000 acres of land in Montezuma County; the Yampa project, designed to supplement the supply for 15,000 acres, near Yampa, Colo.; and the West Divide project, which would supplement the supply for about 8,000 acres along West Divide Creek.

Field investigations were completed and reports were in preparation on three additional projects; the proposed Paonia project on the North Fork of the Gunnison River; the LaPlatta project, near Durango; and the Florida-Mesa project on Florida River, near Durango.

Field investigations were in progress in connection with proposed projects near Meeker, Colbran, Rifle, Hermitage, De Beque, and Silt, Colo.

Ten proposals were being investigated in connection with the eastern slope surveys. The final report on one of these, the Cherry Creek project, in Arapahoe and Douglas Counties, was completed. This project would provide an irrigation system for 4,300 acres of land along Cherry Creek through the reconstruction of the old Castlewood Dam destroyed in August 1934 by flood, or through the construction of a dam at the Cherry Creek site, 2 miles above Castlewood. In either case the dam would create a reservoir sufficient to control practically all floods on Cherry Creek.

Reports on the following projects are in preparation: Arickaree project in Yuma County; North Republican project at Wray; South Republican project, near Burlington; Badito and Huerfano projects, near Badito and Mustang; Trinidad project, near Trinidad; Hugo and Chivington projects, near Limon and Chivington; and the Apishapa project, near Walsenburg.

The Blue River-South Platte investigation is being made to determine the feasibility of diverting water from the upper tributaries of the Blue River in the Colorado Basin to tributaries of the South Platte River to supplement the irrigation supply of lands in the vicinity of Denver and the municipal supply of that city. Field investigations are virtually completed.

The Colorado River investigations were continued through the year. The land classification surveys necessary to determine irrigable and arable areas have been completed.

Colorado-New Mexico-Texas.—The final report of the Rio Grande joint investigations was completed and transmitted to the National Resources Committee. This investigation was made to determine the best method of supplementing the water supply of various irrigation projects in the Upper Rio Grande Valley.

Hawaii.—A preliminary report on the Molokai proposal was completed. This project would consist of construction of intercepting tunnels, small storage reservoirs, and a canal system to provide water for irrigation of about 12,000 acres on the Island of Molokai.

Idaho.—Boise-Weiser-Payette Basins. Investigations have been in progress and field surveys made of storage sites on the Payette and Weiser Rivers, and in connection with possible transmountain diversion from the Salmon River Basin, and a land classification has been in progress of the Mountain Home area.

Surveys are in progress to determine the best dam site on the South Fork of the Snake River to provide storage of flood flows in order to supplement irrigation supplies and to develop incidental power.

Field work was in progress on the Cabinet Gorge survey for the purpose of determining the physical and economic feasibility of hydro-electric development on the Clark Fork of the Columbia River. The power is to be used for irrigation, pumping, and other purposes.

Idaho-Montana.—Work was continued on the Madison River-Snake River diversion investigation.

Montana.—Three projects were under investigation in Montana. They were the Gallatin Valley proposal, the Marias proposal, and proposal for pumping water to small areas in the vicinity of the Milk River project. Reports were in preparation at the close of the year.

Nebraska.—Reconnaissance reports were completed during the year on the proposed Bostwick and the proposed Mirage Flats projects in Nebraska.

Nevada.—Economic surveys and water supply studies were in progress on the Humboldt River project.

New Mexico.—The final report on the Tucumcari project was completed during the year.

North Dakota.—Reports of the Corps of Engineers on the Heart Butte, the Bowman and the Missouri River diversion projects were reviewed by the Denver office during the year.

A report was completed in November on the Buford-Trenton project, which would involve pumping water from the Missouri River for the irrigation of 13,400 acres, near Buford and Williston.

Oklahoma.—Three projects were investigated. They were the Altus project, by which irrigation water would be supplied to 70,000 acres by diversion from the North Canadian River; the Kenton project; and the Fort Supply project.

Oregon.—Four proposed projects were under investigation. They were the Goose Lake Valley project, near Lake View, upon which a reconnaissance report was completed; the Canby project in the Willamette Valley; the Grande Ronde project, near LaGrande; and the Medford project, by which supplemental water would be provided to the Medford irrigation district and the Rogue River Valley irrigation district.

South Dakota.—Four projects also were under investigation in South Dakota. They were the Shadehill project; the Rapid Valley project and the Angostura project in the Black Hills area; and the Gavins Point project.

Texas.—A reconnaissance report was completed on the Balmorhea proposal, and field surveys were completed in connection with flood-control studies on the Colorado River project.

Utah.—Investigations in Utah covered the Dixie project, upon which a report was submitted, and cooperative studies in the Salt Lake Basin. A special study was made of the proposal for a Salt Lake City aqueduct to derive its water from Deer Creek Reservoir on the Provo River project.

Washington.—Surveys of the land of the Columbia Basin project continued throughout the year. A reconnaissance report was completed on the proposed Glenwood project.

Wyoming.—Field work in connection with the studies of the Green River Basin consisted of reservoir surveys in the Black Fork area and preliminary canal surveys extending from the Kendall Reservoir to the divide between Green River and Sweetwater River Basins and thence to the Red Mesa Desert.

Wyoming-Utah-Idaho.—A cooperative investigation was in progress to determine the feasibility of diverting waters from the Green River to Bear River for the irrigation of lands in the Bear River Basin in the States of Wyoming, Utah, and Idaho. Field work consisted of

preliminary canal surveys and surveys of reservoir sites along tributaries of Blacks Fork Creek in Utah. Water supply studies were in progress.

Colorado River Basin.—Miscellaneous surveys consisting of land classification were in progress in several States within the Colorado River Basin as provided in section 15 of the Boulder Canyon Project Act. The field work in connection with these was virtually completed and reports were in preparation at the end of the year.

CIVILIAN CONSERVATION CORPS

Thirty-four Civilian Conservation Corps camps continued to operate on 25 Federal reclamation projects in 14 Western States during the fiscal year. Enrollees at these camps were engaged chiefly in the reconstruction of irrigation systems, including canals and water control structures; in development of supplemental water supplies; and in the improvement and expansion of recreational facilities at irrigation reservoirs.

The Midview Dam, an earth fill structure 50 feet in height and 670 feet in length, on the Moon Lake project in eastern Utah, was completed, creating a 5,000 acre-foot reservoir to augment the project water supply. Construction of the Anita Dam, a similar structure on the Huntley project in southern Montana, was also completed, providing water storage and regulation facilities for the eastern portion of the project. The C. C. C. boys completed riprapping of the lower embankment of the Deer Flat Reservoir on the Boise project; clearing of Clear Creek Reservoir on the Yakima project; repairing of the Lahontan Dam spillway on the Newlands project; reconstruction of the Malone Diversion Dam on the Klamath project, which partially failed during floods in December 1937; construction of the 1,500 acre-foot S-Canal regulating reservoir on the Newlands project; and additional revetment and jetty work on the Yellowstone River in Montana.

The recreational center at Guernsey Lake, Wyo., was substantially completed by C. C. C. forces at the end of the year. Designed to afford recreation in a desert area, its many facilities are being enjoyed by residents from the surrounding countryside. A similar development had made excellent progress at Elephant Butte Reservoir, N. Mex. There a warm water fish hatchery also has been placed in partial use.

During the year additional emphasis was placed on a new and important branch of the C. C. C. work on reclamation projects. C. C. C. crews expanded the number of their demonstrational projects, situated on Government land in the project areas, designed to acquaint farmers with approved and effective methods of controlling or eradicating noxious weeds.

ORGANIZATION

The Commissioner, appointed by the President and under the supervision of the Secretary, is in administrative charge of the Bureau of Reclamation. He is supported by a staff of 115 officers and employees in Washington. The Chief Engineer at Denver, Colo., assisted by 822 employees, is in general supervision of the engineering and construction activities. Twenty-one construction engineers in charge of projects now under construction, a director of power at Boulder City, Nev., and a supervising engineer at Sacramento, Calif., report to the Chief Engineer. Twenty superintendents and engineers in charge of completed projects report to the Supervisor of Operation and Maintenance at Washington. The 56 field offices, including the Denver office, have a combined personnel of 5,936.

An Assistant Commissioner, Roy B. Williams, was appointed during the fiscal year.

RECLAMATION TABLE 1.—Consolidated Financial Statement, June 30, 1938

DEBIT SIDE		
Construction account:		
Primary projects:		
Cost of irrigation works:		
Original construction.....	\$323, 719, 621. 20	
Supplemental construction.....	12, 671, 606. 15	
Value of works taken over.....	2, 196, 625. 12	
Total construction cost.....		\$338, 587, 852. 47
Operation and maintenance prior to public notice, net.....	\$2, 825, 722. 30	
Operation and maintenance deficits and arrearages funded with construction.....	5, 863, 497. 77	
Penalties on water-right charges funded with construction.....	3, 239, 857. 67	
		11, 929, 077. 74
Total.....		350, 516, 930. 21
Less income items:		
Construction revenues.....	\$7, 450, 671. 15	
Contributed funds.....	1, 866, 795. 10	
Nonreimbursable appropriation, Rio Grande Dam.....	1, 000, 000. 00	
		10, 317, 466. 25
		340, 199, 463. 96
Less abandoned works, nonreimbursable cost, and charge-offs.....		17, 117, 514. 60
Balance payable.....		\$323, 081, 949. 36
Palo Verde flood protection, cost of construction and repairs.....		48, 806. 46
Secondary projects and general investigations:		
Cost of surveys and investigations.....	\$4, 343, 703. 39	
Less contributed funds.....	620, 459. 32	
		3, 723, 244. 07
General offices' expense undistributed.....		920, 472. 07
Plant and equipment.....		1, 823, 043. 91
Materials and supplies.....		3, 549, 388. 29
Accounts receivable:		
Current accounts.....	\$1, 663, 505. 11	
Deferred accounts.....	214, 577, 006. 04	
		216, 240, 511. 15

RECLAMATION TABLE 1.—Consolidated Financial Statement, June 30, 1938—Con.

DEBIT SIDE—Continued

Undistributed clearing cost accounts.....		\$256,296.97
Unadjusted debits, disbursement vouchers in transit.....		9,681.68
Cash:		
Balance on hand:		
Reclamation fund.....	\$12,952,325.69	
General fund.....	27,033,990.66	
National Industrial Recovery and P. W. A. allotments.....	5,010,194.60	
Emergency Relief allotments.....	8,282,613.57	
Funds transferred from other departments.....	147,755.36	
Contributed funds.....	60,776.22	
		\$53,487,656.10
In special deposit and in transit.....		95,232.19
		53,582,888.29
Total debits.....		603,236,282.25

CREDIT SIDE

Security for repayment of cost of irrigation works: Contracted construction repayments....	\$263,540,210.10
Current accounts payable.....	4,496,286.71
Deferred and contingent obligations.....	1,200,571.42
Reserves and undistributed profits.....	10,364,819.57
Operation and maintenance results, surplus.....	802,525.95
Unadjusted credits, collection vouchers in transit.....	855.43
Government aid for reclamation of arid lands:	
Reclamation fund.....	\$169,463,715.57
Advances to reclamation fund:	
Treasury loan (act of June 25, 1910).....	\$20,000,000.00
Less amount repaid.....	10,000,000.00
	10,000,000.00
Treasury loan (act of Mar. 4, 1931).....	5,000,000.00
	\$15,000,000.00
National Industrial Recovery and P. W. A. allotments.....	47,671,000.00
Emergency Relief allotments.....	51,103,466.33
Funds transferred from other departments.....	2,419,176.04
General fund—Central Valley project.....	19,380,000.00
General fund—Grand Coulee Dam.....	33,750,000.00
Other general fund appropriations.....	6,371,695.99
	345,159,053.93
Less nonreimbursable appropriation, Rio Grande Dam.....	1,000,000.00
	344,159,053.93
Less impairment of funds:	
Abandoned works.....	\$2,830,934.62
Nonreimbursable construction cost.....	860,742.32
Operation and maintenance cost uncollectible.....	453,272.39
Charge-offs (act of May 25, 1926).....	14,681,872.14
Washington office cost since Dec. 5, 1924.....	2,192,703.02
Attendance at meetings.....	1,815.90
Giving information to settlers, cost.....	11,238.17
Prepaid civil-service retirement funds.....	2,340.33
Operation and maintenance administration.....	31,479.62
Returned to Treasury, miscellaneous receipts.....	90.30
	21,066,488.81
	323,092,565.12
Less impounded funds, economy acts.....	261,552.05
	322,831,013.07
Total credits.....	603,236,282.25

RECLAMATION TABLE 2.—Consolidated statement by projects, of construction costs of irrigation works, other items reimbursable with construction, and amounts repayable

State and project	Construction cost		Operation and maintenance before public notice (net)		Operation and maintenance deficits and arrears, and penalties		Construction revenues, contributed funds, and nonreimbursable appropriations (contra)		Abandoned works non-reimbursable cost and authorized charge-offs	Total repayable	
	Fiscal year 1938	To June 30, 1938	Fiscal year 1938	To June 30, 1938	Fiscal year 1938	To June 30, 1938	Fiscal year 1938	To June 30, 1938		Fiscal year 1938	To June 30, 1938
Arizona:											
Gila Salt River.....	\$2,122,027.04	\$3,035,277.52								\$2,122,027.04	\$3,035,277.52
Yuma auxiliary.....	2,987,508.77	18,016,754.58								3,967,088.74	16,461,573.98
Yuma auxiliary.....	1,237.00	902,060.30								1,236.79	901,565.39
Arizona-California: Yuma											
California:											
Central Valley.....	1,418,290.05	2,770,059.65								3,481.17	9,738,081.38
Orland.....		2,401,049.57								1,418,290.80	2,770,059.65
Colorado:										26,343.97	2,418,783.41
Colorado-Big Thompson	223,072.26	223,072.26									
Fruitgrowers Reservoir.....	29,631.19	29,631.19								223,072.26	223,072.26
Grand Valley.....	908.10	5,020,291.34								29,631.19	29,631.19
Pine River.....	206,157.37	255,408.22								908.10	4,081,374.55
Uncompahgre.....	713,285.79	8,366,469.00								206,157.37	255,408.22
Idaho:										713,024.03	7,588,220.13
Boise.....	247,062.21	16,686,396.71									
Boise-Payette.....	813,661.49	1,786,605.21								108,577.85	17,137,985.29
King Hill.....		1,905,918.80								813,661.49	1,786,605.21
Mindoka.....	1,725.00	19,232,057.90									
Upper Snake River.....	824,266.38	2,006,645.03								8,201.10	18,134,761.61
Kansas: Garden City.....		342,963.68								823,505.56	2,005,711.71
Montana:											
Butter Root.....	60,000.00	947,641.05									
Butter Root.....		186,266.42								60,000.00	1,464,279.00
Buffalo Rapids.....	546,027.51	768,215.68								186,266.42	186,266.42
Chain Lakes.....	9,533.73	263,272.77								546,027.51	768,215.68
Frenchtown.....		1,559,590.40								12,967.12	266,706.16
Huntley.....	1,195.43	6,924,191.50									
Milk River.....	274,168.14	8,561,812.03									
Sun River.....		3,685,433.14								1,105.48	1,862,804.92
Montana-North Dakota: Lower Yellowstone										274,168.34	5,651,911.15
Nebraska-Wyoming: North											
Platte.....	1,445.17	19,331,704.12								1,503.80	4,113,971.18
1 Contra.										145.50	20,972,439.37

Washington:	15,362,112.60	60,613,865.45	147,766.87	14.68	26,882.64	33,477.69	143,533.38	15,328,634.91	60,470,272.07
Grand Coulee.....	67,732.93	1,451,123.45	164,357.08		154,374.40	58,915.77	7,496.28	8,802.48	425,837.24
Okanogan.....		26,280,161.68					511,191.01	2,131,440.69	25,834,773.39
Yakima.....	2,131,440.69	3,636,462.63							3,656,462.63
Yakima-Roza.....									
Wyoming:									
Kendrick.....	4,513,397.97	10,417,728.59				2,932.82	5,955.84	4,610,465.15	10,411,772.75
Riverton.....	580,549.40	5,359,608.40		6,137.27	129,052.72	1,032.00	22,739.65	585,654.67	5,465,981.47
Shoshone.....	8,363.65	10,094,126.54			467,235.88	54,595.68	646,655.96	147,140.34	8,404,821.36
Shoshone-Heart Mountain.....	954,224.87	1,784,726.56	35,244.37			120.00	120.00	954,104.87	1,784,606.56
Total.....	38,813,156.13	338,587,852.47	2,825,722.30	1,340,246.20	9,103,355.44	26,138.71	10,137,459.16	40,145,410.31	323,261,956.45

BOULDER CANYON PROJECT

RECLAMATION TABLE 3.—Financial Statement June 30, 1938

ASSETS AND OTHER DEBITS

I. INVESTMENTS

102	Fixed capital under construction.....	\$111,045,485.09	
103	Other physical properties.....	1,421,862.58	
104	Investigations—Colorado River Basin.....	229,961.57	
104	Investigations—Parker-Gila project.....	65,222.24	
105	Other capital expenditures—Interest during construction.....	17,072,145.84	
106	Earnings and expenses during construction.....	¹ 572,196.68	
Total investments (schedule 2).....			\$129,262,480.64

II. CURRENT AND ACCRUED ASSETS

121	Treasury cash:		
	For advances to Colorado River Dam fund.....	\$4,640,265.49	
	Colorado River Dam fund.....	1,755,570.57	
	N. I. R. A.—Parker-Gila project.....	9,090.67	
	Collections in transit.....	336,495.82	
Total Treasury cash (schedule 1).....		6,741,422.55	
122	Disbursing officers' cash (schedule 1).....	355,704.60	
124	Accounts receivable.....	27,088.48	
Total current and accrued assets.....			7,124,215.63

IV. DEFERRED AND UNADJUSTED DEBITS

141	Clearing and apportionment accounts.....	¹ \$86,115.26	
143	Field cost adjustments.....	35,682.95	
145	Jobbing accounts.....	25,062.34	
146	Prepayments.....		
171	Unadjusted debits.....	7,600.97	
Total deferred and unadjusted debits.....			¹ 17,769.00
Total assets and other debits.....			136,368,927.27

LIABILITIES AND OTHER CREDITS

X. CAPITAL AND LONG-TERM LIABILITY

205	Long-term liability—U. S. Treasury authorized appropriation.....	\$126,500,000.00	
	Less:		
161	Authorized but not appropriated.....	9,190,000.00	
Total long-term liability:			
205.2	Appropriated but not advanced.....	4,640,265.49	
205.3	Appropriated and advanced.....	112,669,734.51	
205.4	Less: Impounded, Legislative Economy Act.....	¹ 137,653.66	
206	N. I. R. A. allotment Parker-Gila project.....	93,000.00	
207	Interest on advances to Colorado River Dam fund.....	18,746,514.26	
208	Judgments—Court of Claims.....	37,766.29	
			136,049,626.89

XI. CURRENT AND ACCRUED LIABILITIES

211	Audited accounts payable:		
211.1	Contractors earnings—current.....		
211.11	Contractors earnings—holdback.....		
211.2	Labor.....	\$62,174.46	
211.3	Purchases.....	3,983.52	
211.4	Freight and express.....	99,045.43	
211.5	Passenger fares.....	750.47	
211.6	Rights-of-way.....		

¹ Contra.

BOULDER CANYON PROJECT—Continued

RECLAMATION TABLE 3.—Financial Statement June 30, 1938—Continued

LIABILITIES AND OTHER CREDITS—Continued

XI. CURRENT AND ACCRUED LIABILITIES—Continued

211.9	Miscellaneous.....	\$6,038.29
211.91	Refunds.....	1.78
	Total audited accounts payable.....	171,993.95
219	Accrued interest.....	
	Total current and accrued liabilities.....	\$171,993.95

XIII. DEFERRED AND UNADJUSTED CREDITS

231	Unadjusted credits.....	2,076.36
-----	-------------------------	----------

XV. RESERVES

258.	Reserve for amortization of long-term debt and payment to States.....	145,230.07
	Total liabilities and other credits.....	136,368,927.27

BOULDER CANYON PROJECT

RECLAMATION TABLE 4.—Appropriations and Cash Statement June 30, 1938

	Regular appro- priation	N. I. R. A. allotment	Total	N. I. R. A. Parker-Gila project
TREASURY CASH				
Appropriations and allotments.....	\$79,310,000.00	\$38,000,000.00	\$117,310,000.00	\$93,000.00
Advances to Colorado River Dam fund..	74,670,000.00	37,999,734.51	112,669,734.51	
Balance not advanced.....	4,640,000.00	265.49	4,640,265.49	
Colorado River Dam fund— Advanced from appropriation to fund.....	74,670,000.00	37,999,734.51	112,669,734.51	
Collections deposited in fund.....	3,597,764.68	22,973.29	3,620,737.97	5,168.92
Total advances and collections...	78,267,764.68	38,022,707.80	116,290,472.48	98,168.92
Disbursements by General Accounting Office.....	6,082,692.20	54,723.63	6,137,415.83	
Advances to disbursing officers.....	70,431,427.98	37,966,058.10	108,397,486.08	89,078.25
Total withdrawals.....	76,514,120.18	38,020,781.73	114,534,901.91	89,078.25
Balance.....	1,753,644.50	1,926.07	1,755,570.57	9,090.67
Repay collections in transit.....	2,008.56		2,008.56	
Miscellaneous collections in transit.....	334,487.26		334,487.26	
Total Treasury cash (G. L. 121)...	6,730,140.32	2,191.56	6,732,331.88	9,090.67
DISBURSING OFFICERS' CASH				
Advances and appropriation transfer adjustment.....	70,441,661.87	37,972,687.98	108,414,349.85	89,078.25
Disbursements by disbursing officers..	70,115,482.41	37,964,002.16	108,079,484.57	68,091.00
Disbursing officers' checking balance.....	326,179.46	8,685.82	334,865.28	20,987.25
Collections by disbursing officers.....	3,936,153.18	29,352.17	3,965,505.35	5,168.92
Collections deposited and appropria- tion transfer adjustment.....	3,936,301.11	29,352.17	3,965,653.28	5,168.92
Collections not deposited.....	¹ 147.93		¹ 147.93	
Total disbursing officers' cash (G. L. 122).....	326,031.53	8,685.82	334,717.35	20,987.25

¹ Contra.

ALL-AMERICAN CANAL

RECLAMATION TABLE 5.—Financial Statement June 30, 1938

ASSETS AND OTHER DEBITS

I. INVESTMENTS

102 Fixed capital under construction.....	\$23,519,095.05
---	-----------------

II. CURRENT AND ACCRUED ASSETS

121 Treasury cash:	
For advances to Colorado River Dam fund.....	\$2,625,000.00
Colorado River Dam fund.....	168,490.16
N. I. R. A. and E. R. A. allotments.....	341,259.32
Contributions—Imperial Irrigation District.....	26,133.72
Collections in transit.....	402.76
Total Treasury cash.....	3,161,285.96
122 Disbursing officers' cash.....	1,532,849.27
124 Accounts receivable.....	59,386.24
Total current and accrued assets.....	4,753,521.47

IV. DEFERRED AND UNADJUSTED DEBITS

141 Clearing and apportionments.....	¹ \$8,155.17
143 Field cost adjustments.....	71,169.70
171 Unadjusted debits.....	16,378.82
Total deferred and unadjusted debits.....	79,393.35
Total assets and other debits.....	28,352,009.87

LIABILITIES AND OTHER CREDITS

X. CAPITAL AND LONG-TERM LIABILITY

205 Long-term liability—U. S. Treasury authorized appropriation.....	\$38,500,000.00
Less:	
161 Authorized but not appropriated.....	10,000,000.00
Total long-term liability:	
205.2 Appropriated but not advanced.....	2,625,000.00
205.3 Appropriated and advanced.....	24,875,000.00
	\$27,500,000.00

XI. CURRENT AND ACCRUED LIABILITIES

211 Audited accounts payable:	
211.1 Contractors' earnings—current.....	\$341,408.91
211.11 Contractors' earnings—holdback.....	321,221.74
211.2 Labor.....	17,581.20
211.3 Purchases.....	28,670.74
211.4 Freight and express.....	75,456.17
211.5 Passenger fares.....	394.76
211.6 Rights of way.....	7,684.80
211.9 Miscellaneous.....	386.96
211.91 Refunds.....	5,258.47
Total current and accrued liabilities.....	798,063.75

XII. OTHER CREDITS

226 Contributed funds—Imperial and Coachella Irrigation District.....	50,000.00
---	-----------

XIII. DEFERRED AND UNADJUSTED CREDITS

231 Unadjusted credits.....	\$2,194.74
231.3 Unadjusted credits—Yuma project.....	52.36
Total deferred and unadjusted credits.....	2,247.10

XV. APPROPRIATED SURPLUS

251 Appropriated surplus not specifically invested.....	1,699.02
Total liabilities and other credits.....	28,352,009.87

¹ Contra.

ALL-AMERICAN CANAL

RECLAMATION TABLE 6.—Appropriation and Cash Statement June 30, 1938

	N. I. R. A. allotment	P. W. A. allotment	Emergency Re- lief allotment	Total	Regular ap- propriation	Imperial Irrigation District
TREASURY CASH						
Appropriated and allotments.....	\$6,000,000.00	\$3,000,000.00	\$10,000,000.00	\$19,000,000.00	\$8,500,000.00	\$50,000.00
Advanced to Colorado River Dam fund.....					5,875,000.00	
Collections deposited.....	18,547.29	3,090.60	23,054.35	44,692.24	118,872.12	
Total advances, allotments, etc.....	6,018,547.29	3,003,090.60	10,023,054.35	19,044,692.24	5,993,872.12	50,000.00
Disbursements by General Accounting Office.....	61,164.24	16.17	551.97	61,732.38	3,381.96	
Advances to disbursing officers.....	5,908,703.36	2,992,997.18	9,740,000.00	18,641,700.54	5,822,000.00	50,000.00
Total withdrawals.....	5,939,867.60	2,993,013.35	9,740,551.97	18,703,432.92	5,825,381.96	50,000.00
Balance.....	48,679.69	10,077.25	282,502.38	341,259.32	108,490.16	
Repay collections in transit.....	258.30			258.30	20.10	
Miscellaneous collections in transit.....					124.36	
Total Treasury cash (G. L. 121).....	48,937.99	10,077.25	282,502.38	341,517.62	2,793,634.62	
DISBURSING OFFICERS' CASH						
Advances and appropriation transfer adjustments.....	5,908,878.34	2,992,997.18	9,740,000.00	18,641,875.52	5,822,000.00	50,000.00
Disbursements by disbursing officers.....	3,808,715.39	2,873,837.44	9,378,625.55	18,061,178.38	4,869,847.87	23,866.28
Disbursing officers' check balance.....	100,162.95	119,159.74	361,374.45	580,697.14	952,152.13	26,133.72
Collections by disbursing officers.....	18,909.82	3,090.60	23,054.35	45,054.77	119,016.58	50,000.00
Collections deposited and appropriations transferred.....	18,909.82	3,090.60	23,054.35	45,054.77	119,016.58	50,000.00
Collections not deposited.....						
Disbursing officers' cash balance.....	100,162.95	119,159.74	361,374.45	580,697.14	952,152.13	26,133.72

THE BONNEVILLE PROJECT

J. D. Ross, *Administrator*

THE Bonneville project, now an active and developing organization, was created by act of the Seventy-fifth Congress (approved August 20, 1937) for making available for use and sale the electric energy generated by the Bonneville plant on the Columbia River. Pursuant to the provisions of this act, the Secretary of the Interior on October 12, 1937, appointed Mr. J. D. Ross, of the Securities and Exchange Commission, to the office of Administrator of the Bonneville project. An office was opened in Portland, Oreg., on November 15, 1937. The Bonneville plant itself was ready for operation when it was dedicated by the President on September 12, 1937.

The first funds made available to the Bonneville project were supplied by an appropriation of \$100,000 in the third deficiency bill of the Seventy-fifth Congress. This was to cover the organization and preliminary work in the determination of policies and initial development of the program.

The Administrator, in compliance with the basic policy expressed in the Bonneville Act, has directed his program for the distribution of the power generated by the Bonneville plant so as

“to encourage the widest possible use of all electric energy that can be generated and marketed * * *” and to “provide for uniform rates or rates uniform throughout prescribed transmission areas in order to extend the benefits of an integrated transmission system and encourage the equitable distribution of the electric energy developed at the Bonneville project.”

The Administrator conducted public hearings during the period March 10 to 18, 1938, in several cities of Idaho, Oregon, and Washington. On the basis of these hearings and engineering investigations a rate schedule was prepared as follows:

	<i>Per kilowatt-year</i>
A-1 Power available full time at the Bonneville plant.....	\$14. 50
B-1 Power available part time at the Bonneville Plant.....	9. 50
C-1 Power available full time on the lines of the Bonneville project....	17. 50
D-1 Power available part time on the lines of the Bonneville project...	11. 50

These rates, approved June 8, 1938, by the Federal Power Commission, are among the lowest of record, and are such as to induce and encourage the use of electric energy over a large geographical area and in a variety of types of load.



AIR VIEW OF BONNEVILLE DAM, THE SPILLWAY, POWERHOUSE, LOCKS, AND FISHWAYS.

Concurrently with the development of policies and rates the Administrator has organized a staff for engineering design and construction. The project has received an additional appropriation of \$3,500,000, which will be expended for the construction of transmission lines and substations. The construction program contemplated for completion during 1940 is shown in the map.

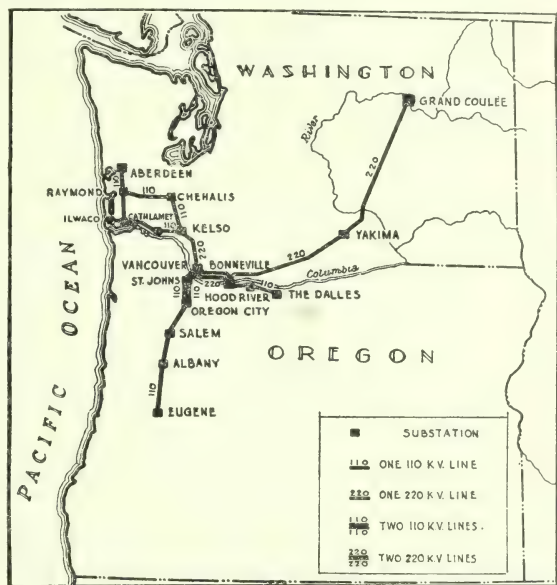
This program will provide transmission lines designed for operation at 220,000 volts, reaching from Bonneville to Grand Coulee, and from Bonneville through Vancouver and Kelso to Chehalis, Wash.; also, lines designed for 110,000 volts, from Chehalis to Aberdeen, from Kelso to Ilwaco and Raymond, in Washington; and from Bonneville to The Dalles and Vancouver to Eugene in Oregon.

The construction of these lines will require 357 miles of three-conductor lines for 220,000 volt service, and 278 miles of three-conductor lines for 110,000 volt service. For these lines, about 3,500 towers weighing a total of 25,000 tons, 1,200 miles of 220 kv conductor weighing a total of 4,500 tons, 850 miles of 110 kv conductor weighing a total of 1,500 tons and about a quarter of a million large-size, suspension-type porcelain insulators. Some of the lines will be supported by steel towers, and some will be supported by wooden poles.

Associated with these lines are planned substations at Yakima, North Bonneville, Vancouver, Kelso, Chehalis, Aberdeen, Raymond, and Ilwaco, Wash.; and St. Johns (in Portland), Oregon City, Salem, Albany, Eugene, Hood River, and The Dalles, Ore.

The present appropriation is not sufficient to provide for all of the contemplated construction, but additional allotments are expected under authorizations of the Public Works Administration. Approximately \$15,000,000 will be required to complete the program now contemplated.

Many inquiries for Bonneville power are being received from prospects in various localities, and numerous industrial organizations are considering possible use of energy at sites near the Bonneville plant.



A chart of the Bonneville Project to be completed in 1940.

A glance at the accompanying map will suggest the enormous possibilities for utilization of energy from Bonneville. The lines shown are traced through the populous and productive regions which are tributary to Portland, Oreg., and one high-voltage line will reach to Grand Coulee. This Grand Coulee line will serve for the transmission and interchange of power in a network of high-voltage lines which will ultimately be required to distribute the energy of the Columbia River plants. Bonneville and Grand Coulee are the first two installations of a system of Columbia River plants which will have an ultimate installed capacity of about 8,000,000 kilowatts.

The Bonneville plant, itself, now has a generating capacity of 86,000 kilowatts in two turbogenerator units. When finally completed, Bonneville will have 10 units with a combined capacity of approximately 500,000 kilowatts. The present two units of the Bonneville plant could serve a residential population about equal to that of the city of Portland, Oreg. However, 50 percent of this initial plant capacity will be reserved for sale to public bodies and cooperatives. Not more than 20 percent of the installed capacity of the Bonneville plant may be used to furnish power to industrial customers who may locate near the dam.

The demand for Bonneville power is expected to develop from three causes. First, power now generated in the vicinity of Bonneville, from fuel, is comparatively expensive; second, the private utilities in this region are installing very little new generating equipment; and, third, this will be the first time that energy at such a low price as half a cent per kilowatt-hour has been available in regions remote from large generating plants.

It has been found that the uses of electric energy increase both in variety and amount when rates are materially reduced. It appears probable that rates in this region will be reduced to about half or even less than half of those now prevailing. A reduction of this magnitude probably will result, within a year after the completion of the Bonneville project lines now contemplated, in a demand for all of the output the Bonneville plant can produce. The load should increase to about 200,000 kilowatts by the year 1943, at which time Bonneville units Nos. 3 and 4, included in the authorization of six made by the last Congress, will have been installed. By that time also, additional project lines will probably have been required. The official provision for these additional units makes it feasible to establish schedules of construction on a firm basis, and to undertake contracts for the distribution of increasing amounts of energy.

GENERAL LAND OFFICE

Fred W. Johnson, *Commissioner*

READJUSTMENT of its activities to meet the primary responsibilities placed upon it by a universally recognized need for prudent conservation of the natural resources on the public domain, was the outstanding problem met by the General Land Office during the fiscal year.

Through careful regrouping of personnel, and the installation of modern business practices, a greatly improved organization was maintained with which to administer the provisions of law and Executive orders affecting the national conservation program.

At the same time, operations of the General Land Office resulted in the return to the Federal Treasury of \$5 for every \$1 expended upon its administrative activities. Largest in any year since 1927, total cash receipts aggregated \$8,447,374.97 while total expenditures from appropriations made for the conduct of the Office was \$1,821,681. Exceeding last year's receipts by \$1,047,535.03, returns of the present fiscal year showed an excess of receipts over expenditures of \$6,625,693.97.

The situation under the conservation program now confronting this Office, which for 150 years has handled all the negotiations of the Government with respect to its public lands, may best be realized from a brief survey of the national land picture as it was and as it is today.

Before 1934, the work of the General Land Office consisted mainly in disposing of and in carefully recording the transfers of available tracts of public land. There was plenty of land to be allocated, and the duty of the General Land Office was to make sure that disposals were made in accordance with the law.

With the enactment of the Taylor Grazing Act in 1934, new fields of activity were placed within the General Land Office for administration. Under that act, and in accordance with the provisions of Executive orders, all public lands were withdrawn from disposal. No allocation of any of the public domain may now be made until after scientific classification to determine the highest use to which it can be put. In addition to the problems encountered in the necessity for classification of all the public domain before it can be disposed

of, administration of mineral development upon the public domain and grazing activities on public land tracts not included in grazing districts are among the responsibilities of the General Land Office.

A highly important field of activity confronting this Bureau under the new program is the necessity for conducting land disposal negotiations under the provisions of the act of June 1, 1938 (Public No. 577), which authorizes the Secretary of the Interior to sell or lease tracts of not exceeding 5 acres of public land for cabin, home-site, convalescent, recreational, or business purposes. Classification must be made of the public lands to determine the areas suitable for disposition under the terms of this law.

The act of August 28, 1937 (50 Stat. 874), provided a comprehensive land use program for the revested Oregon and California Railroad and Coos Bay Wagon Road grant lands, in Oregon. Extensive land classifications also will be required in connection with the prudent development of this area. Headquarters for this work are maintained at Portland, Oreg.

CADASTRAL ENGINEERING SERVICE

The Cadastral Engineering Service of the General Land Office is charged with the execution of cadastral surveys and resurveys of the public lands of the United States proper and Alaska, the supervision of mineral surveys for patent, and the preparation of the technical and legal records of the work performed.

During the year field projects were executed in 21 States and the Territory of Alaska under 208 separate groups, 106 of which in 17 States were of resurveys. In these areas 34,480 linear miles, embracing 5,985,310 acres, were surveyed and resurveyed, exclusive of engineering investigations and many types of miscellaneous and special projects not measurable on a quantity basis.

Office work in all branches was maintained on a current basis. There were constructed 282 township base plats, 127 color overlay sheets, 127 supplemental plats, and field notes were prepared in final form for the permanent record for all surveys relating thereto. In addition, 172 mineral surveys, embracing 521 locations, were examined, platted, and approved.

Requests by other Federal agencies for surveys and resurveys to meet the requirements of administration, conservation, and rehabilitation of the national estate, continued in increasing number and geographic scope. Applicants included the Forest Service, Division of Grazing, Bureau of Reclamation, National Park Service, Geological Survey, Office of Indian Affairs, and the Soil Conservation Service.

Accepted surveys and resurveys.—There were accepted and placed on file plats representing 2,385,337 acres of original surveys of public

lands, and, in addition, 1,801,883 acres of lands resurveyed, comprising an aggregate area of 4,187,220 acres.

Maps, plats, and diagrams.—The wall map of the United States has been revised to show changes since the publication of the 1936 edition, and preliminary action taken for printing the 1938 edition.

There have been prepared 211 miscellaneous maps, plats, diagrams, and tracings.

Photolithographic copies, etc.—There were sold 7,937 photolithographic copies of township plats, for which \$3,968.50 was received, and 9,972 copies were furnished to other bureaus for official use. There were 932 maps mounted and distributed for official use, and appropriate distribution was made of 6,855 map publications and 91,580 circulars.

CIVILIAN CONSERVATION CORPS

Advancing conservation of valuable natural resources on the public domain, the work of the Civilian Conservation Corps was carried on during the fiscal year from four camps under the jurisdiction of the General Land Office. Two of these camps are engaged in the control of the coal fires on federally owned coal beds in the Little Thunder Basin, Wyo.

During the fiscal year not a single lost-time accident to any enrollee occurred, notwithstanding the extremely hazardous nature of the work involved. Camps have been assigned to this work since the inception of the C. C. C. program in 1933 and during all of that time not a single lost-time accident has been reported, although over 100,000 man-shifts have worked on these fires and over 2,700,000 man-miles have been traveled by truck in the fire control work.

During the year work was conducted on 14 different projects, involving 13 separate and distinct underground coal fires and one emergency forest fire, as well as incidental undertakings such as construction of roads to reach the fires, etc.

Two C. C. C. camps were transferred to the jurisdiction of the General Land Office from the Forest Service on June 1, 1938, for conservation work on the revested and reconveyed lands in Oregon. While these camps were engaged under the supervision of this Office for only a small portion of the fiscal year they were actively employed in fire suppression and fire hazard reduction work, thus contributing to the conservation of the valuable timber on those areas.

REVESTED OREGON AND CALIFORNIA RAILROAD AND RECONVEYED COOS BAY WAGON ROAD GRANT LANDS

The act of August 28, 1937 (50 Stat. 874), provided a comprehensive land-use conservation program, which will require extensive field examination and classification of all the revested Oregon and Cali-

fornia Railroad and reconveyed Coos Bay Wagon Road grant lands.

Pending completion of such classification and determination of the annual sustained yield capacity of the timber growing area and in order to prevent the shutting down of operating lumbering concerns with resultant unemployment and hardship to a large number of persons, timber cutting has proceeded under temporary regulations, embodying certain definite and desirable conservation features as to sound forestation practices, reforestation guarantees, and fire prevention. On July 7, 1938, permanent regulations were approved embodying these and other conservation features. The old practice of issuing patent for the timber purchased has been abandoned in favor of the execution and approval of a timber contract and the period for the cutting and removal of the timber has been reduced from 10 to 2 years.

Transactions concerning revested and reconveyed lands follow:

Restored, etc.—No restorations to homestead entry were made, and 243.84 acres were reclassified as timber land.

Timber sales.—Eighty sales of timber on the revested Oregon and California Railroad grant lands were made, involving 9,916.40 acres of land, containing 262,162,000 feet board measure of timber, for which the sum of \$460,701.55 was received. Total sales to June 30, 1938, 1,218, involving 144,551.13 acres, containing 3,593,249,980 feet board measure of timber, for which a total of \$7,930,182.69 was received.

Seven sales of timber on the reconveyed Coos Bay Wagon Road grant lands were made, involving 1,124 acres of land, containing 31,413,000 feet board measure of timber, for which the sum of \$108,637.37 was received. Total sales to June 30, 1938, 129, involved 20,864.78 acres, containing 829,790,000 feet board measure of timber, for which a total of \$1,944,302.04 has been received.

Timber rights terminated.—Rights under timber patents were terminated in 39 cases.

RECEIPTS AND EXPENDITURES

The total cash receipts from sales, leases, and other disposals of public lands (including receipts from copies of records, sales of Government property, etc.) were \$8,393,511.69, and from sales of Indian lands \$53,863.28, an aggregate of \$8,447,374.97, all of which was deposited in the Treasury. The total expenditures from appropriations made for the conduct of the Office was \$1,821,681. The excess of receipts over expenditures was \$6,625,693.97. The receipts were the largest in any year since 1927, exceeding last year's receipts by \$1,047,535.03.

Receipts under Mineral Leasing Acts.—Receipts from bonuses, royalties, and rentals under laws providing for the leasing rights on the public domain (including royalties and rentals on potash deposits

and royalties on coal leases in Alaska) aggregated \$6,675,973.26, of which \$6,527,113.62 was received under the act of February 25, 1920 (41 Stat. 437). The largest receipts under this act were from lands in California, the amount being \$3,422,595.68. Wyoming was second with \$1,679,357.71. Receipts from other States follow: New Mexico, \$804,739.70; Louisiana, \$247,807.30; Colorado, \$122,456.83; Utah, \$121,980.25; Montana, \$95,703.99; North Dakota, \$25,051.47; Alabama, \$5,113; Idaho, \$1,674.38; South Dakota, \$451.31; Nevada, \$160; and Mississippi, \$22. Under the provisions of the mineral leasing act cited, each State receives 37½ percent of the receipts thereunder from the public lands within its borders, the reclamation fund receives 52½ percent, and the other 10 percent remains in the Treasury of the United States as miscellaneous receipts.

Receipts under the Taylor Grazing Act.—The amounts received as fees on grazing licenses, by grazing districts, and by States, and the receipts for fees and rentals under section 15 of the act, are as follows:

	Fees on licenses from grazing districts		Fees and rentals under section 15	State totals
	District	Amount		
Arizona.....	1	\$20,989.33	-----	-----
	2	3,993.38	-----	-----
	4	13,392.55	-----	-----
		38,375.26	\$9,874.32	\$48,249.58
California.....	1	7,610.82	-----	-----
	2	17,216.36	-----	-----
		24,827.18	718.95	25,546.13
Colorado.....	1	18,679.82	-----	-----
	2	4,927.62	-----	-----
	3	12,771.06	-----	-----
	4	7,249.62	-----	-----
	6	5,128.51	-----	-----
		48,756.63	2,623.38	51,380.01
Idaho.....	1	26,195.40	-----	-----
	2	27,326.42	-----	-----
	3	15,753.37	-----	-----
	4	9,324.01	-----	-----
		78,579.20	1,509.68	80,088.88
Montana.....	1	2,862.40	-----	-----
	2	3,178.89	-----	-----
	3	2,177.40	-----	-----
	4	1,048.05	-----	-----
	5	3,314.75	-----	-----
		12,581.49	3,066.12	15,647.61
Nevada.....	1	40,549.82	-----	-----
	2	28,730.25	-----	-----
	3	14,056.51	-----	-----
	4	24,474.59	-----	-----
	5	1,386.32	-----	-----
		109,197.49	-----	109,197.49

	Fees on licenses from grazing districts		Fees and rentals under section 15	State totals
	District	Amount		
New Mexico.....	2	34,635.85	-----	-----
	3	31,938.26	-----	-----
	4	28,354.45	-----	-----
	5	10,077.33	-----	-----
	6	64,892.82	-----	-----
		169,898.71	1,069.82	170,968.53
Oregon.....	1	1,137.97	-----	-----
	2	15,497.15	-----	-----
	3	12,900.31	-----	-----
	4	5,814.01	-----	-----
	5	4,227.03	-----	-----
	6	2,946.73	-----	-----
	7	889.87	-----	-----
		43,413.07	1,151.72	44,564.79
South Dakota.....			20.00	20.00
Utah.....	1	8,407.49	-----	-----
	2	28,062.34	-----	-----
	3	34,939.81	-----	-----
	4	15,052.32	-----	-----
	5	20,412.90	-----	-----
	6	23,298.95	-----	-----
	7	18,820.65	-----	-----
	8	15,697.27	-----	-----
		164,691.73	-----	-----
Washington.....			920.21	164,691.73
				920.21
Wyoming.....	1	20,857.91	-----	-----
	2	24,561.57	-----	-----
	3	33,075.64	-----	-----
	4	38,738.58	-----	-----
	5	9,944.58	-----	-----
		127,178.28	26,977.87	154,156.15
Grand total.....		817,499.04	47,932.07	865,431.11

Distribution of receipts.—Receipts from all sources, aggregating \$8,447,374.97, as shown above, are distributed under the law approximately as follows: Reclamation fund, \$3,632,307.52; for range improvements, \$216,357.78; to public land States and certain counties within such States, \$3,411,493.70; general fund, \$1,119,350.40; and to various Indian tribes, \$67,865.57.

Under the provisions of the Taylor Grazing Act, the States within which the lands are situated receive 50 percent of the receipts from public lands and 25 percent of the receipts from ceded Indian lands; 25 percent of the receipts from both public and ceded Indian lands is available, when appropriated by Congress, for range improvements; 50 percent of the receipts from ceded Indian lands is credited to the Indians; and the balance is deposited into the general fund in the Treasury.

Five percent of the net proceeds from cash sales of public lands is paid to the public land States within which such sales were made, and the balance of such receipts from States named in the Reclamation Act is credited to the reclamation fund; the reclamation fund and the States involved receive 90 percent (52½ and 37½ percent

respectively) of the receipts under the mineral leasing act and of receipts from potash deposits leased under the act of February 7, 1927; receipts from sales of reclamation town sites and camp sites and from royalties and rentals from potash deposits leased under the act of October 2, 1917, are credited to the reclamation fund; all of the receipts from proceeds of land and timber in the forfeited Oregon & California Railroad grant to March 1, 1938, will be paid to certain counties in Oregon in lieu of taxes. Receipts from the Oregon & California Railroad grant lands since March 1, 1938, are divided between the general fund in the Treasury and the counties, 25 percent to the general fund and 75 percent to the counties. Twenty-five percent of the proceeds of land and timber in the forfeited Coos Bay Wagon Road grant will be paid to Coos County, Ore. The receipts from Indian lands (except 37½ percent of royalties from Red River oil lands which are paid to the State of Oklahoma in lieu of taxes) are deposited in the Treasury to the credit of the various Indian tribes. All other moneys are deposited in the Treasury to the credit of the general fund.

The following table shows in detail the distribution of the receipts, insofar as is possible before final settlement of all accounts by the General Accounting Office.

	Distribution in the Treasury				
	General fund	Reclamation and range improvement	State and county funds	Indian trust funds	Total
Sale of public lands.....	\$29,419.44	\$64,914.59	\$3,740.41	-----	\$98,074.44
Fees and commissions.....	14,234.98	67,742.95	-----	-----	\$81,977.93
Receipts from mineral leases.....	679,003.69	3,426,734.65	2,447,667.61	-----	1 6,553,405.95
Receipts from Oregon and California Railroad grant lands.....	41,237.86	-----	463,531.35	-----	2 504,769.21
Receipts from Coos Bay Wagon Road grant lands.....	82,475.00	-----	27,419.39	-----	3 109,894.39
Receipts under Taylor Grazing Act.....	205,101.13	216,357.78	421,458.92	\$22,513.28	4 865,431.11
Potash royalties and rentals.....	10,444.01	67,226.58	39,165.03	-----	5 116,835.62
Copying fees.....	18,070.05	-----	-----	-----	18,070.05
Power permits.....	16,429.45	-----	-----	-----	16,429.45
Reclamation town lots.....	-----	5,688.75	-----	-----	5,688.75
Sales and leases of Indian lands.....	-----	-----	8,510.99	45,352.29	6 53,863.28
Miscellaneous (including sales of standing timber, coal leases and town lots in Alaska, rent of land, etc.).....	22,934.79	-----	-----	-----	22,934.79
Total.....	1,119,350.40	3,848,665.30	3,411,493.70	67,865.57	8,447,374.97

¹ First and fourth columns contain \$26,292.33 royalties received in Wyoming under the act of June 26, 1926.

² Until Mar. 1, 1938, the entire receipts from these lands were paid to the counties in Oregon in lieu of taxes. Beginning with that date 75 percent of the receipts is paid to the counties and the other 25 percent is deposited into the general fund.

³ 25 percent, exclusive of commissions, is payable to Coos County, Ore.

⁴ 50 percent of the receipts from public lands and 25 percent of the receipts from ceded Indian lands are paid to the States; 25 percent of the receipts from both public and ceded Indian lands are available, when appropriated by Congress, for range improvements; 25 percent of the receipts from public lands is deposited into the general fund; and 50 percent of the receipts from ceded Indian lands is credited to the Indians.

⁵ All receipts under the act of Oct. 2, 1917 (a total of \$12,395.54), and 52½ percent of the receipts under the act of Feb. 7, 1927 (a total of \$104,440.08), are credited to the reclamation fund. 37½ percent of the receipts under the later act is payable to the States and 10 percent is deposited into the general fund.

⁶ Included in receipts from Indian lands is \$22,795.99 royalties on oil and gas from Kiowa, Comanche, and Apache lands, south half of Red River, Okla., of which the States receives 37½ percent in lieu of taxes.

REPAYMENTS

The act of June 16, 1880 (21 Stat. 287), and the act of March 26, 1908 (35 Stat. 48), as amended by the act of December 11, 1919 (41 Stat. 366), provide for the return of moneys received in connection with the disposal of public lands and covered into the United States Treasury.

Repayment may be made to the land applicant or his heirs or assigns, where lands have been erroneously sold, where payments have been made in excess of lawful requirement, and where applications, entries and proofs have been rejected, no fraud appearing. Under the above cited laws there were stated 72 accounts, allowing repayment of \$4,186.27, and 43 claims were denied. The claims allowed include nine accounts granting repayment of \$819.56 received in connection with sales of Indian reservation lands and repaid from Indian trust funds.

THE PUBLIC LANDS

General withdrawals.—By Executive Order No. 6910 of November 26, 1934, issued under authority of the act of June 25, 1910 (36 Stat. 847), as amended by the act of August 24, 1912 (37 Stat. 497), the vacant, unreserved, and unappropriated public lands in the States of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, and Wyoming were temporarily withdrawn from settlement, location, sale, or entry subject to existing valid rights. This order was amended by Executive Order No. 7048 of May 20, 1935, so as to make it applicable to all lands within the States mentioned upon the cancellation or release of prior entries, selections, or claims, or upon the revocation of prior withdrawals, unless expressly otherwise provided in the order of revocation, and so as to authorize the Secretary of the Interior, in his discretion, to accept title to land offered in exchange under the provisions of section 8 of the Taylor Grazing Act. Executive Order No. 6910 was further amended by Executive Order No. 7235 of November 26, 1935, so as to permit sales under section 14 and the issuance of leases under section 15 of the Taylor Grazing Act, and so as not to debar the recognition or allowance of bona fide nonmetalliferous mining claims. Executive Order No. 6910 was further amended by Executive Order No. 7274 of January 14, 1936, so as to exclude from the operation thereof all lands which were then or might thereafter be included within grazing districts established pursuant to the provisions of the Taylor Grazing Act, so long as such lands remain a part of any such grazing district.

By Executive Order No. 6964 of February 5, 1935, issued under authority of the said act of June 25, 1910, as amended, all public lands in the States of Alabama, Arkansas, Florida, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Nebraska, Oklahoma, Washington,

and Wisconsin were temporarily withdrawn from settlement, location, sale, or entry subject to valid existing rights. Executive Order No. 6964 was amended by Executive Order No. 7363 of May 6, 1936, so as to permit exchanges under section 8, sales under section 14, and the issuance of leases under section 15 of the Taylor Grazing Act.

Executive Orders Nos. 6910 and 6964 were further amended by Executive Order No. 7599 dated April 1, 1937, so as to exclude from their operation all lands identified by survey made after the respective dates of the orders and which upon the date of the acceptance of the survey would otherwise become a part of the school land grant of designated sections to any of the States mentioned in the said orders.

Classification for entry under any law authorized.—Section 7 of the Taylor Grazing Act of June 28, 1934 (48 Stat. 1269), as amended by section 2 of the act of June 26, 1936 (49 Stat. 1973), authorizes the Secretary of the Interior in his discretion, to examine, classify, and open to appropriate entry any lands withdrawn by the Executive order of November 26, 1934, as amended, or the Executive order of February 5, 1935, or any lands within a grazing district, which are more valuable or suitable for the production of agricultural crops than for the production of native grasses and forage crops, or more valuable or suitable for any other use than for the use provided for under said act, or proper for acquisition in satisfaction of any outstanding lien, exchange, or scrip rights or land grant, except that homestead entries may not be allowed for tracts exceeding 320 acres in area. Revised instructions governing the filing of applications for entry, selection, or location under said section 7 were approved June 29, 1937, Circular No. 1353b.

The said section 7, as amended, further provides that locations and entries under the mining laws, including the act of February 25, 1920 (41 Stat. 437), as amended, may be made upon such withdrawn and reserved areas without regard to classification and without restrictions or limitation by any provision of the act.

Unappropriated public lands and public lands in grazing districts.—On June 1, 1938, each register was requested to report by counties and townships the area of the unappropriated and unreserved public lands within and outside of grazing districts in his land district, as of April 30, 1938, treating lands affected by the above-mentioned Executive Orders Nos. 6910 and 6964 as unreserved. Reports have not yet been received from all the offices. The figures, when received, will be compiled and made available for general use. The data as to lands in grazing districts is required in order to effect proper distribution of payments to the States, as provided for by section 10 of the Taylor Grazing Act.

GENERAL STATEMENT

On June 30, 1938, about 6,500,000 acres were embraced in unperfected entries upon which proof of compliance with the law was not

due or had not been presented. In addition, there were pending applications for exchange under the Taylor Grazing Act involving approximately 2,500,000 acres of privately owned and State school land and about the same area of public land.

Exchanges of national forest lands required the examination of abstracts of title involving 183,892 acres.

There were furnished during the year 43,078 certified and uncertified copies of entry papers, plats, field notes, patents etc., for which there were received amounts aggregating \$11,650.85. In addition, there were furnished for official use by this and other departments and agencies 18,234 copies of such items.

Three hundred forty-eight letters were written in connection with pending and proposed suits, applications of agents or attorneys for admission to practice before the Department, and charges preferred against United States commissioners, registers, attorneys and others.

Twenty-eight civil suits were recommended to cancel leases for oil and gas, coal, potash, borax, and sodium, to cancel patents issued through fraud, and to recover damages for loss of property in connection with timber trespass. Judgment was asked for the amount of money due. Twenty-four cases were reported as won and two lost. As a result of the suits, judgments and compromises have been reported amounting to \$174,240.

Applications of attorneys and agents for admission to practice before this Department amounted to 29, of which number 25 received favorable recommendation while 4 were suspended for further evidence.

There were decided on principles of equity and referred to the Board of Equitable Adjudication and confirmed 1,268 homestead entries of public lands, 55 homestead entries of revested and reconveyed lands in Oregon, 36 homestead entries of ceded Indian lands, 23 reclamation homesteads, and 60 desert-land entries.

The number of letters and reports received for consideration or answer from all sources during the year was 151,376 and 72,209 letters and decisions were written. The latter figure does not include letters prepared for signature in the Department.

Reports were submitted on 82 Senate and House bills, and necessary orders and instructions have been prepared or are in course of preparation in connection with bills, public and private, affecting the public lands, which were enacted into law. Reports were made on 38 enrolled bills.

The regulations of the General Land Office "of general applicability and legal effect" on June 1, 1938, were codified for inclusion in the Code of Federal Regulations. When this compilation is made available in printed form, it will be the first time in the history of the General Land Office that all of its principal regulations have been

brought together in up-to-date form and made available for general use.

On June 30, 1938, there were 310 permanent employees of the General Land Office in Washington, 71 in the district land offices, 164 in the field surveying service and 2 in the Chippewa logging service.

HOMESTEAD ENTRIES

Actions were taken in homestead cases as follows: On second-entry applications, 97; on applications to amend, 72; on applications for leaves of absence and for extensions of time to establish residence, 861; and on original entries, 4,686. There were patented 4,125 final and commuted homestead entries.

PUBLIC SALE AND TIMBER AND STONE APPLICATIONS

Four hundred fifty-four actions were taken on public sale applications, 98 of which were patented; and 26 actions were taken on timber and stone applications, 2 of which were patented.

FILING OF PLATS OF SURVEY

Instructions were issued for the filing of 180 plats of survey for lands in States in which there are district land offices. Thirty plats were directly filed by this Office in connection with which 9 public notices were prepared, for lands in States in which there are no district land offices.

MISCELLANEOUS APPEALS IN EX-PARTE CASES

Appeals in ex-parte cases involving applications and entries under the homestead, timber and stone and isolated tract laws, were considered in 5,953 cases.

NATIONAL FOREST HOMESTEAD LANDS

Nine thousand four acres in national forests which had been listed for homestead entry under the act of June 11, 1906 (34 Stat. 233), were returned to national forests by revocation of the listing orders and 194 acres were restored to homestead entry under said act.

CONTESTS OTHER THAN MINERAL CONTESTS

Six hundred fifty-five contests, including both Government and private, were considered. Approximately 78 hearings were held in Government cases. Appeals in these proceedings were considered in 39 cases. At the close of the year about 16 contest cases were pending

MINERAL LEASES AND MINING CLAIMS

Oil and gas leases and permits.—At the beginning of the year there were outstanding 1,020 leases embracing 405,671.72 acres. Fifty-two leases were issued based upon discoveries for 47,109.80 acres; leases for 3,328.65 acres in 9 producing oil and gas fields were sold, on which the bonus was \$175,852.38; 107 noncompetitive leases under the act of August 21, 1935, issued for 125,105.41 acres, leaving outstanding at the end of the year 1,177 leases embracing 576,927.22 acres. On July 1, 1937, 8,068 prospecting permits embraced 11,463,027.60 acres. One hundred sixty permits were issued and one reinstated, increasing the area under permit by 235,400 acres. One hundred four permits were canceled and 755 were terminated by law, decreasing the area under permit by 476,806.60 acres, and leaving outstanding 7,370 permits embracing 11,221,621 acres.

Coal, potash, sodium, phosphate, and sulphur permits and leases, and coal and phosphate licenses.—On July 1, 1937, there were 371 coal leases, embracing 70,562.83 acres; 30, embracing 4,872.99 acres, were issued; and 27, embracing 3,737.38 acres, were canceled, leaving 374 leases covering 71,698.44 acres. On the date named 198 coal permits embraced 144,063.83 acres, 28 permits, covering 18,799.88 acres, were issued; 24 were canceled and 42 expired by limitation; area, 35,937.58, leaving 160 permits embracing 126,926.13 acres. On July 1, 1937, 88 coal licenses embraced 3,484.25 acres; 16, involving 563.75 acres, were issued; 1 was canceled and 11 expired; the area combined 448.75 acres, leaving 92 licenses embracing 3,599.25 acres. No potash or phosphate leases were issued, but one phosphate lease was amended by the addition of 80 acres. On July 1, 1938, there were outstanding 11 potash leases for 27,785.49 acres; 28 potash permits for 62,548.87 acres; and 7 phosphate leases embracing 3,352 acres. During the year 9 sulphur permits for 5,985.01 acres were issued, bringing the total to 27 permits covering 17,508.01 acres. Twenty-two sodium permits, embracing 36,227.38 acres, were issued during the fiscal year, making in all 47 sodium permits for 65,586.36 acres.

Mineral applications and entries.—Ninety-three applications were disposed of and 53 entries, embracing 2,839.38 acres, were patented. Ninety mineral applications for 12,042.83 acres and 200 mineral entries for approximately 14,918.97 acres were pending at the end of the year.

Mineral contests.—Eighty-seven mineral contests were disposed of, leaving 44 pending decision at the expiration of the year.

RIGHTS-OF-WAY

Three hundred and twenty-eight right-of-way applications were approved and 41 stock-watering reservoir applications were disposed

of. In addition, 49 right-of-way applications were rejected, and 114 other actions were taken.

FEDERAL RECLAMATION PROJECTS

There are 49 Federal reclamation projects in 14 Western States, 22 of which are operated in whole or in part by the water users. There are, in addition, five Indian reclamation projects, the irrigation features of which are under the supervision of the Office of Indian Affairs.

Four hundred and ninety-six original reclamation homestead entries and 127 assignments of such entries were received; and 231 reclamation entries were patented.

DESERT LAND ACT

One hundred and two entries were patented under the Desert Land Act.

CAREY ACT

Carey Act segregations amounting to 76,299.84 acres were considered, on which either final or interlocutory action was taken.

PITTMAN ACT

Thirty-eight cases were received under the Pittman Acts of October 22, 1919 (41 Stat. 293), and September 22, 1922 (42 Stat. 1012). Action has been taken in all but 20 cases.

SWAMP AND OVERFLOWED LANDS

Under the swamp land acts, there were approved and patented to the States 1,628.74 acres, and claims for 353.61 acres were finally rejected. New claims were asserted for 1,017.87 acres.

STATE GRANTS AND SELECTIONS

New indemnity school-land selections embracing 2,577.35 acres were received, and selections amounting to 130,595.65 acres were approved and title conveyed to the States. Such selections involving 7,820.48 acres were canceled. Pending selections under quantity grants to States, for specific purposes, embracing 80,781.36 acres, were approved and title conveyed to the States.

Applications for patents for granted school sections under the provisions of the act of June 21, 1934 (48 Stat. 1185), were approved for patent during the latter part of the year, amounting to 208,798.24 acres, for which patents had not issued on June 30, 1938. Such applications pending at the end of the year embrace 1,598,024.23 acres.

New applications by the various States, under the Taylor Grazing Act, for exchanges of lands were received, embracing 266,067.44 acres. Selections involving 79,957.26 acres were approved, and

patents were issued in 24 cases embracing 50,377.16 acres. The rejected and relinquished applications involved 123,260.19 acres.

RAILROAD GRANTS AND SELECTIONS

Four new railroad selections were received, embracing 7,556.66 acres, and 3,302.02 acres were certified or patented in lieu of such grants.

ABANDONED MILITARY RESERVATIONS

Sales aggregating \$781.50 were made of lands and improvements in abandoned military reservations which have been transferred to this Department for disposal. Ten patents embracing 356.48 acres were issued on homesteads of such lands while one patent was issued where the lands were sold.

ALASKA

On June 30, 1938, there were outstanding 32 leases for fur farming covering approximately 170,260 acres. Matters relating to fur farm leases were considered in 164 instances. Three renewal leases were issued; two new leases were issued; and two leases were canceled.

On June 30, 1938, there were 13 grazing leases in effect embracing approximately 899,312 acres. Matters relating thereto were considered in 43 instances.

AVIATION LEASES

On June 30, 1938, there were outstanding 32 leases for aviation covering 14,691.94 acres. One application for lease was rejected and three such applications were pending.

COLOR OF TITLE

Nineteen applications for the sale of improved or cultivated public lands held under color of title for more than 20 years were approved and patented. The sum of \$3,431.18 was received from such sales. Two hundred and sixteen actions were required in cases involving color of title matters.

EXCHANGES

Various acts of Congress provide for exchanges of lands in order to effect consolidations of Government or private holdings or for other specific purposes.

Twenty-one patents were issued in forest-exchange cases and title was accepted to 183,892.47 acres of land for inclusion in national forests. The Secretary of Agriculture was notified in 58 cases that timber permits might issue to the exchange applicants.

Exchanges for the consolidation or extension of Indian reservations resulted in the addition of 3,637.58 acres to such reservations.

At the close of the fiscal year, there were pending under section 8 of the Taylor Grazing Act, 140 applications for exchanges involving 277,043.37 acres of public land and 285,431.71 acres of privately owned land. Most of these cases were awaiting reports from the field. Three cases were pending in the Department on appeal, and six cases were awaiting action in this office. Sixteen cases were rejected and one exchange was consummated.

GRAZING LEASES

Two thousand five hundred and thirty-eight offers of term grazing leases were made under section 15 of the Taylor Grazing Act, involving 3,967,126.16 acres, with an annual rental of \$94,221.02. One thousand four hundred and fifteen leases were issued embracing 1,836,593 acres, with an annual rental of \$45,896.81. At the close of the fiscal year, 3,628 applications for leases were pending, a majority of which were awaiting reports from the Division of Investigations. Three hundred and fifty applications and petitions for renewal were denied because the lands involved were not subject to lease.

INDIAN LANDS AND CLAIMS

Two contracts involving the sale of pine timber on ceded Chippewa Indian lands in Minnesota were virtually completed during the year and the sum of \$9,241.03 was credited to the "Chippewa in Minnesota" fund for the benefit of the Chippewa Indians.

Entries and sales of ceded Indian lands were considered in 720 instances. Sixty-seven patents issued on homesteads and two patents issued on sales. The sum of \$15,045.38 was received from the disposition of 6,083.14 acres of ceded Indian lands.

The matter of fee and trust patents on Indian allotments was considered in 800 instances and 66 fee patents embracing 8,186.40 acres and 259 trust patents involving 40,070.01 acres were issued.

Nine hundred and ten patents embracing 5,173.22 acres were issued on non-Indian claims within confirmed Indian pueblos in New Mexico.

PRIVATE LAND CLAIMS

Private land claims which were recognized or confirmed by many acts of Congress in the early history of the Government were considered in 152 instances and 22 patents for such claims issued embracing 7,933.77 acres.

TIMBER

Sales of dead, down, or damaged timber were considered in 80 instances. The sum of \$463.74 was received from such sales. Free use timber permits received special consideration in this office in 14 instances.

TOWN LOTS AND TOWNSITES

Town lot matters were considered in 220 instances and 160 patents were issued for town lots from which the sum of \$21,067.50 was received. Matters involving entire townsites were considered in six instances. Two patents were issued for townsites.

TRESPASS

Timber trespass cases required 431 actions and the sum of \$12,674.12 was accepted in settlement; coal trespass cases were considered in 165 instances and the sum of \$435.75 was accepted in settlement. Other actions included three for grazing, eight for gravel, and one for turpentine.

MISCELLANEOUS CASES

Actions were taken and patents issued as follows: Arkansas drainage, 48, with 4 patents issuing; bounty land warrants, 22, with 3 patents issuing; cash and credit, 45, with 27 patents issuing; preemptions, 13, with 4 patents issuing; quitclaim deeds, 14, with 10 quitclaims issuing; riparian rights, 18, with 2 patents issuing; scrip, 13, with 5 patents issuing; small holding claims, 31, with 10 patents issuing; soldiers' additional, 363, with 7 patents issuing; and special acts, 3, with 2 patents issuing. One claim for relief in connection with Mud Lake, Minn., was approved for payment.

TRACT BOOK NOTATIONS

More than 100,000 notations were made on the tract books. This includes 13,858 homestead applications and other miscellaneous cases, 5,328 grazing applications, 4,723 final and cash certificates, 2,878 oil and gas lease applications, 151 coal lease applications, 409 original entries, and 199 plats.

Withdrawals and classifications.—Six hundred and sixty-one Executive and other orders were noted. These include withdrawals for stock driveways, national forests, restored lists, power-site reserves and classifications, grazing districts, and mineral and other classifications and revocations thereof.

Relinquishments.—Entries numbering 545 were relinquished and noted.

Status cases.—Status was furnished in 20,082 cases.

Township diagrams.—Diagrams showing disposals and status, in 854 townships and fractional townships, were made for this and other bureaus.

WITHDRAWALS AND RESTORATIONS

The area of existing power-site reserves was decreased by 2,838 acres, that of the public water reserves was increased by 1,030 acres, and the lands classified as valuable for hydroelectric power purposes

were increased by 83,969 acres. Tracts aggregating 1,270 acres were restored from power-site designations under the Arizona and New Mexico Enabling Act and the Oregon and California Railroad Co. Revestment Act, while the areas in reclamation projects under the act of June 17, 1902, were decreased by 429,620 acres.

The Olympic National Park was created in Washington, the Isle Royale National Park was established in Michigan, and the Hot Springs National Park in Arkansas was enlarged, involving the reservation of 755,362 acres. Three new national monuments were created, four were enlarged and two were abolished, the net decrease being 249,006 acres. The area of the national forests was increased by 339,931 acres. Twelve new wildlife refuges were established, six were enlarged and one was reduced, resulting in a net increase of 398,264 acres. Withdrawals amounting to 7,754 acres were made for air navigation sites for the Department of Commerce, while 521 acres were released from former withdrawals for such use. Three tracts of public land were sold under the recreation law to the States of Oregon and Oklahoma and to the town of Sampson, Wis., one recreational petition was denied, one lease issued, and 1,435 acres were released from recreational withdrawals. Eight stock driveways were enlarged, 4 were revoked and 18 were reduced, resulting in a net decrease of 353,792 acres.

Withdrawals aggregating 252,258 acres were made for use by the Farm Security Administration, successor of the Resettlement Administration, and 3,187 acres purchased by the latter were transferred by Executive order from the jurisdiction of the Department of Agriculture to the jurisdiction of this Department. Withdrawals for lighthouse purposes were reduced by 1,120 acres, a withdrawal of 40 acres for use by the War Department as an airplane site was revoked, and one for the use of an Indian tribe expired by limitation.

MINERAL WITHDRAWALS AND CLASSIFICATIONS

A summary of the outstanding mineral withdrawals and classifications as of June 30, 1938, is as follows:

	Withdrawn	Classified
Coal.....	26, 971, 813	33, 276, 103
Oil.....	5, 168, 593	71, 884
Oil shale.....	5, 989, 949	4, 081, 208
Phosphate.....	1, 889, 601	302, 219
Potash.....	9, 411, 906	-----
Total.....	49, 431, 862	37, 731, 414

The area of the withdrawn oil land, shown above, includes 13,578 acres withdrawn as a helium reserve. The figures given include much land which has been patented with or without a reservation of min-

erals. The areas so patented have not been computed. However, some or all minerals have been reserved in patents aggregating 43,-645,798 acres issued under the stock-raising and other laws, for lands not withdrawn or classified as valuable for minerals, as well as for lands so withdrawn or classified.

Tables showing in condensed form some of the activities and accomplishments of the General Land Office during the fiscal year are as follows:

Mineral Leases, Permits, and Licenses Outstanding on June 30, 1938

Class	Leases		Permits		Licenses	
	Number	Acres	Number	Acres	Number	Acres
Oil and gas.....	1, 070	451, 821	7, 370	11, 221, 621		
Oil and gas, act Aug. 21, 1935.....	168	184, 608				
Coal.....	374	71, 688	160	126, 926	92	3, 599
Potash.....	10	25, 505	23	54, 696		
Phosphate.....	7	3, 352				
Sodium.....	2	801	47	65, 586		
Sulphur.....			27	17, 508		
Total.....	1, 631	737, 175	7, 627	11, 486, 337	92	3, 599

Summary of Areas on Outstanding Mineral Leases, Permits, and Licenses, as of June 30, 1938

	Number	Acres
Leases.....	1, 631	737, 175
Permits.....	7, 627	11, 486, 337
Licenses.....	92	3, 599
Total.....	9, 350	12, 227, 111

Leases Other Than Mineral, Outstanding on June 30, 1938

Class	Number	Acres
Term grazing leases under Taylor Grazing Act ¹	1, 415	1, 836, 593
Temporary leases under Taylor Grazing Act.....	187	665, 000
Grazing leases, Alaska.....	13	899, 312
Fur farm leases, Alaska.....	32	170, 260
Aviation leases.....	32	14, 692
Leases for mineral and medicinal springs.....	1	40
Leases for water wells.....	2	80
Total.....	1, 682	3, 585, 977

¹ In addition, there were outstanding on June 30, 1938, 1,123 offers of term grazing leases covering 2,130,533 acres.

Original Entries

	Public land		Indian land	
	Number	Acres	Number	Acres
Homesteads:				
Stockraising.....	101	41,383	5	1,695
Enlarged.....	19	4,239	1	268
Reclamation.....	158	15,056	4	700
Forest.....	6	611		
Section 2289 et al.....	163	17,172	7	786
Total homesteads.....	447	78,461	17	3,449
Deserts.....	4	696		
State selections.....	5	2,646		
Railroad selections.....	3	546		
Applications and filings.....	183			
Miscellaneous.....	84	45,145	6	
Total.....	726	127,494	23	3,449
Indian land as above.....	23	3,449		
Grand total.....	749	130,943		

Final Entries

	Public land		Indian land	
	Number	Acres	Number	Acres
Homesteads:				
Stockraising.....	2,497	1,174,702	93	40,025
Enlarged.....	265	72,167	35	6,274
Reclamation.....	188	18,716	31	2,884
Forest.....	29	2,945		
Commuted.....	12	823	19	1,652
Section 2289 et al.....	961	93,413	40	3,797
Total homesteads.....	3,952	1,362,766	218	54,632
Deserts.....	102	12,125	5	759
Public auction.....	147	15,452	1	40
Timber and stone.....	2	120		
Mineral.....	134	10,586	2	499
Miscellaneous.....	368	21,005	40	200
Total.....	4,705	1,422,054	266	56,130
Indian land as above.....	266	56,130		
Grand total.....	4,971	1,478,184		

Patents and Certificates

	Number	Acres
Homesteads:		
Stockraising.....	2,670	1,328,072
Enlarged.....	356	91,367
Reclamation.....	245	23,371
Forest.....	52	5,074
Section 2289, et al.....	1,057	105,188
Total homesteads.....	4,380	1,553,072
Deserts.....	113	14,356
Public auction.....	98	9,866
Timber and stone.....	2	89
Mineral.....	53	2,839
Railroad.....	7	2,957
Special acts.....	994	1,819,342
Miscellaneous.....	1,168	84,926
Total patents.....	6,815	2,487,447
Certified to States.....		137,425
Grand total.....	6,815	2,624,872

¹ Includes 672,650 acres of school section land, patented to the State of Iowa under the act of June 21, 1934 (48 Stat. 1185).

LANDS PATENTED WITH MINERAL RESERVATIONS

The following table shows the areas patented during the year and the total areas heretofore patented in which minerals in some form have been reserved to the United States.

Classes of patents	Fiscal year	Total
	<i>Acres</i>	<i>Acres</i>
Stockraising Act, all minerals reserved.....	1, 328, 072	30, 441, 344
Other acts:		
All minerals reserved.....	162, 300	606, 492
Coal only reserved.....	26, 534	10, 812, 002
Some named minerals reserved.....	27, 574	1, 785, 960
Total.....	1, 544, 480	43, 645, 798

DIVISION OF GRAZING

F. R. Carpenter, *Director*

AT THE END of the fiscal year, the Division of Grazing had completed approximately 3½ years of operations as the administrative unit in charge of grazing districts established under the Taylor Grazing Act of 1934. Activities concerning the regulation of range use were continued as formerly under the system of issuing temporary, 1-year grazing licenses, pending the accumulation of data sufficient to warrant the issuance of term permits as prescribed in the act.

This year, these annual licenses will be replaced by term permits of not more than 10 years' duration, in 1 grazing district in each of the 10 States affected, namely, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming.

In order to take care of the existing livestock industry pending the issuance of term permits, grazing licenses were issued to 18,752 stockmen owning 9,050,771 head of livestock in 48 grazing districts during the year. In addition, under a cooperative grazing association plan in Montana Grazing District No. 1, a district in which the amount of Federal range is comparatively small, 10 associations grazed approximately 150,000 livestock on lands of all ownerships in that district.

Twelve grazing districts established in late 1937 in Idaho, Montana, Oregon, Wyoming, and Nevada, were placed under regulations for the first time in 1938. The amount of Federal range involved in these 12 districts was 30,086,579 acres; the increase in licenses resulting from the addition of these districts was 3,685, and the increase in the number of livestock using grazing districts under regulation was 3,476,148.

The endeavors of administration have been geared so that rules promulgated and their application would recognize and promote the preservation of the soil and forage resources, the improvement and development of the range, and its orderly use in promoting the stability of the livestock industry.

Whereas the first year and one-half of the Division of Grazing's activities were occupied mainly in acquainting the public and the Federal officials with the law and its objectives, building an adminis-

trative and technical force, and charting the course leading to sound land management, the next 2 years were devoted largely to enlarging and refining the general program.

The fiscal year 1938 may be considered a year of definite accomplishment in which the tools used were given a cutting edge. With a view to solving the many questions attendant upon the issuance of term permits, specific studies in grazing districts were necessary. The control of grazing and the regulated use of the range brought together a harmony of purpose among the users and the administration with gratifying results in the program of conservation and the stabilization of the range-livestock industry.

The fourth year of administration witnessed refinements and further accomplishments in the program of wildlife conservation on the public ranges. In many districts the Division of Grazing made a reasonably accurate estimate of the numbers and species of big game animals using the range during part or all of the year. Cooperation with Federal and State agencies and sportsmen's associations afforded the means of redistribution of big game from congested areas to less congested areas suitable to their habitat. A considerable part of the improvements made on public ranges and many of the control measures instituted during the year were in the interest of big game animals and birds.

Cooperative arrangements with other Federal agencies, State associations, stockmen groups, and game associations continued to feature the conservation program which the Taylor Grazing Act is designed to foster.

The interrelation of private and public lands was responsible for the clause of section 3 of the act which directs that preference in grazing privileges shall go to those who have land and water dependent upon the public land for their proper use. Now after 4 years of administration of this act, its meaning and outcome can be interpreted with a fair degree of certainty. The resources and conditions in all of the 49 grazing districts have been appraised. In some districts the appraisals have been necessarily superficial owing to pressure for specific information and immediate administrative needs. However, the studies were sufficient in scope to afford action that would promote the proper use of the range and the interrelated private properties.

Other districts have been intensely studied and allotted to some individual, group of individuals, or community in such a way as to augment the use of their private land and water under restrictions which safeguard the sustained yield of grass. Ample provision has been made for the welfare of a sustained population of a reasonable number of game animals and upland birds in all districts.

The entire public range is being surveyed and classified for its proper use and rehabilitation, and more than 20,000 private properties dependent thereon are likewise being appraised. The method of obtaining information and receiving recommendations from local advisory boards has continued to demonstrate the merit of this system of operating this vital resource. There were 665 locally elected district advisers in the 49 grazing districts. These men are all practical stockmen who live and operate on the public range. In some districts, such as those in New Mexico, a wildlife representative has been appointed to membership on each board.

Many of the accomplishments during the year were the realization of plans that were outlined during the preceding year. The comprehensive range survey and report covering New Mexico Grazing District No. 5 was completed at the close of the preceding fiscal year. The material was used as a guide to devise standards of measurement and rules to govern the adjudication of range privileges in the Southwestern States where water is prime base property. During the year, a similar study of Colorado Grazing District No. 6 was completed and used as a basis for adjudication of range privileges in the Northwestern States where feed is a necessary requisite to a yearlong livestock operation and land is considered prime base property.

Using the data obtained from the range-surveys studies of these two districts, the Director of Grazing began at the outset of the fiscal year to prepare a code for the adjudication and the future management of the Federal range.

Cooperative agreements with other Federal agencies that were arranged during 1937 were continued during 1938. Under the western range-survey cooperative agreement, field work in 17 counties in the Western States was completed and the reports reviewed and made available to all cooperative agencies.

The cooperative range study in northeastern Nevada, involving the Bureau of Agricultural Economics, the Division of Grazing, and other agencies interested, was continued through the fiscal year. The area studied includes all of Nevada grazing district No. 1, mainly in Elko County, and is one of the outstanding examples of cooperative effort on the part of State and Federal agencies that has been so far undertaken. The study affords an opportunity for the cooperative agencies to work out principles and methods of public and private range-land management that will apply, perhaps with some modification to meet local conditions, to large parts of the West. The Division of Grazing anticipates issuing term permits in lieu of the present temporary licenses in Nevada grazing district No. 1 within the next year. The issuance of these permits will mark a most important stage in the history of range management in this and adjoining areas.

ORGANIZATION

The administrative set-up of the Division of Grazing consists of a Washington headquarters staff, including the Director, the Assistant Director, Administrative Assistant, two experts on land law, one expert on land classification, one expert on the technical phases of land use, and the necessary clerks; a field staff with headquarters at Salt Lake City, Utah, which is composed of a deputy director, a chief of range management, a chief of range improvements, a chief of range surveys, and a chief hearings examiner. Nine regional graziers, one for each State except California, 33 district graziers, 22 range examiners, and the necessary clerks complete the field organization. The total regular personnel is 128.

In addition to the regular staff there are 665 district advisers who are elected by popular vote within the district they represent and appointed to serve at the call of the regional grazer in a recommendatory capacity.

These advisory boards of the Division of Grazing have been of inestimable value in the formulation of the Federal Range Code and, in furnishing an abundance of needed information to the administrative authorities, have been responsible for much of the progress and accomplishments.

STATUS OF GRAZING DISTRICTS

The 252,763,500-acre area embraced within the 49 grazing districts under regulation during the year naturally involves many different types of ownership. For the most part, the State and private grazing lands interspersed therein with public lands are similar to them and are leased and owned by livestock operators. In addition to the 112,823,338 acres of vacant, unappropriated, unreserved lands affected by the withdrawal of November 26, 1934, there are more than 10,000,000 acres of prior withdrawals within grazing districts, most of which, by agreement, are under temporary administration of the Division of Grazing. Lands in this category include stock driveways, power site reserves, military reserves, naval oil shale reserves, public water reserves, and reclamation withdrawals.

THE FEDERAL RANGE CODE

The experiences of the Division in the regulation and management of the public range in grazing districts during the first 3 years of administration forcibly crystallized a common view among stockmen and Federal officials that a Federal Range Code broad enough for proper action on all manner of cases was needed. Specific data from two widely divergent grazing districts were used as a guide to formulate new rules that would cover nearly all conditions expected to be encountered.

Consideration revolved around the methods of establishing a suitable legal yardstick under which the necessary reduction of use on the overcrowded public range could be made. Two weapons that can be exactly measured furnished the foundation of the yardstick, (1) commensurability and (2) priority.

COMMENSURABILITY

When the Taylor Grazing Act was passed in 1934, the range was infested with what were known as nomadic sheepmen. These men ordinarily owned or leased little or no real estate but trailed and grazed their flocks over public lands, and their operations often put the established land-owning ranchmen out of business by stripping the range of forage. Section 3 of the Taylor Grazing Act said that preference in permits should go for "the proper use of lands and waters owned, occupied, and leased" by certain parties.

The natural deduction from the existing state of facts and a reading of the law was that control of land or water was to be a prerequisite for a preference right on the range, and the amount of an applicant's land or water would be the yardstick for measuring the extent of such use. This principle was early accepted in meetings in the Western States and was never seriously disputed anywhere.

PRIORITY

After the matter of commensurability was established, it was apparent that a rule would be required to limit such parties to those who were established in the range livestock business, if any degree of stabilization was to be attained. From this need came the so-called priority rule. After many trial rules, hundreds of meetings and discussions, and years of experimenting, a compromise has been reached on a priority rule which is accepted as sound. It is set forth in the Federal Range Code under the definition of "land dependent by use" and is as follows:

Land dependent by use means forage land which was used in livestock operations in connection with the same part of the public domain, which part is now Federal range, for any 3 years or for any 2 consecutive years in the 5-year period immediately preceding June 28, 1934, and which is offered as base property in an application for a grazing license or a permit filed before June 28, 1938. Land will be considered dependent by use only to the extent of that part of it necessary to maintain the average number of livestock grazed on the public domain in connection with it for any 3 years or for any 2 consecutive years, whichever is the more favorable to the applicant, during the 5-year period immediately preceding June 28, 1934.

RANGE SURVEYS

The primary function of the range-surveys organization is to obtain the necessary factual data to form a basis for administrative action in the granting of range privileges and the management of the public

range. This work involves: (1) The gathering, analyzing, selection, and presentation of pertinent material already existing which concerns the public-range area to be studied; (2) securing historical data on past and present livestock use of the area; (3) determination of the extent, character, proper season of use, forage-producing capacity, and suitable rate of stocking of the public range; (4) determination of the qualifications of livestock operators who use or desire to use the public range through the examination and rating of the base properties, both land and water, owned or controlled by those claiming dependence on the use of the public range; (5) furnishing such accumulated information to the administrative force as fast as it becomes available in order to form a factual basis for administrative action in the selection of those entitled to share in the use of the range; and (6) development of essential data and preparation of maps to be used in range-management plans and correlation of proper land-use principles involving all types of ownership.

There are approximately 12,500 townships, each containing 36 square miles of land within the boundaries of the 49 grazing districts in operation during the year. Status and base maps have been designed on a scale of 1 inch to the mile assembled into sheets containing 32 townships, each sheet being 4 townships wide and 8 townships long. Each of the 10 Western States is divided into map areas corresponding to the 32-township sheets and each sheet given an identifying number. Key maps for office reference, as a means of identifying the number system, are prepared on a similar scale. Five hundred and twenty-nine of these base maps of the 32-township size are required to cover the territory embraced in the 49 grazing districts.

At the end of the fiscal year, 2,345 of the 12,426 townships in grazing districts had been surveyed; status had been completed in 2,893 of the 13,154 master township plats involved; 158 of the 529 status maps had been prepared; 243 of the 529 base maps were drafted; and 9,337 of the 31,083 dependent properties had been appraised.

The principal efforts of the range-survey organization since January 1, 1938, have been devoted to the task of assembling all necessary factual data covering one district in each of the 10 States in an effort to have these districts on a permit basis by January 1, 1939.

LAND CLASSIFICATION

The classification of lands with respect to their value for agricultural purposes as required by the various land laws is a duty of the Division of Grazing. This classification involves all lands located within or without the boundaries of grazing districts which are applied for under applicable land laws in accordance with section 7 of the Taylor Grazing Act as amended June 26, 1936.

It is also the duty of the Division to determine the propriety of applications under sections, 8, 14, and 15 of the Taylor Grazing Act from the standpoint of public benefit where the lands involved are located within grazing districts.

The recommendations for designations of lands applied for under the enlarged and stock-raising homestead acts and determination of the value of watering places for public purposes, together with the preparation of appropriate orders, are other functions of the Division of Grazing. The designations under the enlarged and stock-raising homestead acts are made principally for the purpose of permitting the adjudication of homestead entries having valid claims established prior to the Executive orders of November 26, 1934, and February 5, 1935, withdrawing public lands for classification.

At the beginning of the present fiscal year, there were 612 cases pending under sections 7, 8, 14, and 15. During the year, 889 cases were received, making a total of 1,501 cases to be acted upon. Of this number, 804 were acted upon, leaving 697 cases pending at the end of the fiscal year. Ninety-nine cases under the enlarged and stock-raising homestead acts were acted upon, and on June 30 there were 31 cases pending action by the Division; 1,520 acres were designated under the enlarged homestead act in 7 States, increasing the total acreage so designated to 268,471,745 acres; 3,000 acres of land were designated under the stock-raising homestead act in 11 States, increasing the outstanding area to 102,443,062. During the fiscal year, 840 acres in 6 States were included in water reserves, and 980 acres in 6 States were excluded from such reserves, decreasing the gross public water reserve area in 12 States to 511,383.

RANGE IMPROVEMENTS

The range improvement program of the Division was consolidated and put into effect during the fiscal year 1938. This consolidation has already demonstrated its value in promoting efficiency of administration, supervision, and planning of the work program and has proved to be a valuable step in further decentralizing the C. C. C. unit.

Funds made available for range improvements under sections 10 and 11 of the Taylor Grazing Act are expended with the greatest possible benefit due to this consolidation because the range-improvement activities are thus dovetailed, and, by use of coordinated planning, a large proportion of the money made available under these sections is usable for the purchase of equipment and supplies to be used directly in the districts in which the grazing fees are paid.

PERMITS TO CONSTRUCT IMPROVEMENTS

Under section 4 of the act, the Secretary is authorized to issue permits to construct fences, wells, reservoirs, and other improvements on the public lands necessary in the care and management of permitted livestock.

Fences are the principal improvements constructed under the provisions of section 4, and in States where range allotments are advanced, as in Arizona and New Mexico, the majority of permits of this nature were issued. Approximately 760 miles of fences were constructed by 137 applicants during the year. Also, 56 permits were issued to construct miscellaneous improvements, such as installing water troughs, cutting corrals, small reservoirs, wells, and trail gates.

CIVILIAN CONSERVATION CORPS

The purpose of the Civilian Conservation Corps activities of the Division of Grazing is to rehabilitate the public domain and to convert thousands of acres of formerly unused range into good grazing land for livestock. During the fiscal year 1938 there were 45 camps assigned to the Division, 21 of which were located in the Salt Lake City, Utah, region and 12 each in the Albuquerque, N. Mex., and Reno, Nev., regions. The enrollees of these camps are supervised by the Army when in camp and by the Division of Grazing, C. C. C., when engaged in the construction of improvements on the public land.

The work projects of the 45 C. C. C. camps being operated under the jurisdiction of the Division in the 9 Western States of Arizona, California, Colorado, Nevada, New Mexico, Idaho, Oregon, Utah, and Wyoming are those recommended by the advisory boards of the grazing districts and approved by the regional grazier of the region in which the camps operated. In each case the projects are planned to relieve the most acute need of the area, whether it be water development, fence construction, definition of stock boundaries, rodent control, or some other work of vital importance to proper range management. While the work accomplished has in each case proved of immediate benefit, construction was planned, for future benefits as well, with the object not only of relieving present range conditions but also of providing future means of conservation and protection of the 110,000,000 acres of range land administered by the Division.

Water is the prime requisite of the public domain. Sections of the Federal range used partially or not at all in past years are being made available for grazing purposes largely through conservation and distribution of water. Dams have been built to impound the water from mountain streams and to preserve the early run-off, and check dams have been built in dry creeks for the purpose of arresting soil

erosion and moderating run-off for impounding downstream. The development of springs where feasible has been accomplished, and in many cases wells have been drilled in an endeavor to provide reliable watering places on vast dry areas in order that the range may be more properly and seasonably serviced and thus afford a better distribution of use. In connection with this water development, storage facilities such as troughs and tanks have been constructed, not only conserving the water but also providing much better watering facilities.

Closely allied with the water program is the work of opening truck trails into the grazing regions and building stock trails for the movement of animals from winter to summer range or to market. This trail construction opens up large areas of grazing lands formerly more or less inaccessible and not only furnishes much needed new pasture but also aids in the elimination of overgrazing in other areas. The holding corrals constructed along these trails allow stock to be held overnight on the way to market and are of great advantage to stockmen. A sufficient water supply is included in the construction of each corral. Bridge and cattle-guard construction are important parts of these trails and are of great assistance in expediting the movement of cattle and reducing losses of livestock.

An extensive rodent-control program has proved of great value in the conservation of soil and forage resources. More than 1,401,378 acres have been treated for control of ground squirrels, gophers, prairie dogs, kangaroo rats, and jack rabbits. Eradication of poisonous weeds has proved very important in saving livestock, and 98,798 acres have been treated for infestations of poisonous larkspur, death camas, and other weeds which cause the death of hundreds of head of livestock.

The following table shows the accomplishments of the major work projects of the Division's Civilian Conservation Corps program for the fiscal year 1938:

Bridges.....	37
Fences (miles).....	477
Reservoirs.....	52
Springs.....	68
Wells—fully equipped.....	41
Cattle guards.....	62
Corrals.....	65
Truck trails (miles).....	1, 046
Stock trails (miles).....	264
Check dams:	
Permanent.....	125
Temporary.....	1, 919
Other flood-control structures.....	40
Acres treated for poisonous plant eradication (acres).....	98, 798
Acres treated for rodent eradication (acres).....	1, 401, 378
Impounding and diversion dams.....	166

Educational Program

The C. C. C. unit has been vigilant and aggressive in its education program in various camps. The chief objectives of the educational program are vocational, character, and citizenship development with specific consideration given to job training. The enrollees are given every opportunity to learn to operate the machinery used on the work projects, and, through the daily work in connection with classroom instruction, many skilled workers have been developed from completely untrained men. Systematic instruction on the job includes practice on the job in the field and at least 2 hours per week of systematic basic instruction underlying the work off the job. This basic instruction includes a general course in conservation. The effectiveness of the education and training on the job program of these C. C. C. camps may be judged from the fact that much of the difficult construction has been done under the supervision of foremen who were formerly enrollees. Already many of the enrollees have been advanced to special jobs in the C. C. C. of the Division and others will become valuable permanent employees.

COOPERATION

1. Local Associations of Stockmen

To remedy the situation of interspersed land ownership, where State, county, tax-default, and privately owned lands are checker-boarded and intermingled with public domain lands, the Department early realized the necessity for some coordinated plan of management, with a system of unified control for all these lands if economic and sane use were to be established. To make possible this form of administration, a general form of cooperative agreement to be used in entering into agreements with local associations of stockmen was approved by the Secretary. On March 14, 1938, the Department approved another form of cooperative agreement to be used by the Secretary in entering into agreements with local associations of livestock men. This is known as the Oregon form of agreement to distinguish it from the form already in use referred to as the Montana form. The Oregon form is considered as being better adapted for use in areas where the acreage of the Federal range is in excess of the privately controlled land, which is just the opposite from the situation in Montana. In general, the Montana form provides for turning the public lands over to the associations for administration under general supervision of the Secretary, while in the Oregon form the association turns its lands over to the Secretary to be administered in the same manner as the public lands.

During the fiscal year ending June 30, 1938, the number of these cooperative agreements with local associations of stockmen was

increased by five, and two agreements were amended. There are five agreements and seven amendments pending. The total number of these agreements approved to date is 22.

2. Southern Pacific Land Company

The cooperative agreement with the Southern Pacific Land Company which became effective January 1, 1937, was extended for one year to December 31, 1938.

WILDLIFE

At the outset of the administration there was a realization that wildlife in the course of western conquest and expansion of the range-livestock business had through natural competition been deprived of its rightful share in the use of the public lands. Before establishing any grazing districts, the Secretary of the Interior explored all angles of the wildlife situation and its needs with respect to public land, and, after conferences with wildlife agencies and groups in Denver in February 1935, numerous conferences were arranged to discuss the subject. As a result of cooperation with State and Federal agencies in wildlife and sportmen's associations and of efforts on the part of the Division of Grazing, approximately 8,000,000 acres of public land within the boundaries of established grazing districts are now reserved for wildlife use. Three game ranges, aggregating in area more than 3,500,000 acres, have been set aside on the public land to be administered jointly by the Division of Grazing of this Department and the Biological Survey of the Department of Agriculture.

The idea underlying the arrangement to create game ranges with primary protection to wildlife and yet retain a part of the range for use by domestic livestock under regulation is believed to be a natural way of handling such a program. In all game ranges the public land is set aside for this joint use, but the prior right to the use of the land is given to a specified number of wildlife species.

Wildlife refuges are established for the sole purpose of propagating and protecting wildlife, and the jurisdiction is placed in the Department of Agriculture after the land has been withdrawn from other uses. Sixteen wildlife refuges have been created by Executive order, aggregating in area approximately 4,000,000 acres of public land.

The management of wildlife within grazing districts in New Mexico continued with amicable relations between the stockmen, the Division of Grazing, and the State Fish and Game Commission which fostered the principle that wildlife in New Mexico is entitled to share to a reasonable extent in the use of all the range jointly with livestock.

A plan has been initiated in Oregon, by the stockmen using public ranges, whereby in cooperation with Federal agencies harmonious relationship between owners of domestic livestock and agencies

responsible for wildlife may be promoted. Steps similar to the Oregon plan have been taken in all other public-domain States. Through the aid of the licensees within grazing districts, it is expected that a reasonably accurate census of all forms of wildlife will be available in the near future. An important phase of that census will bring to light reasonably safe estimates of the amount of public land needed to afford proper seasonal use by game animals in addition to that required for domestic livestock.

In Idaho, the Division of Grazing furnished some of its C. C. C. facilities and means for employing on a repayment basis a technical man from the Biological Survey who directed the transplanting of beaver from areas where they are unwelcome to public domain areas where they contributed an inestimable amount of valuable soil and stream-bed conservation. This activity had the benefit of three outstanding results: (1) Restoration of the beaver population; (2) arresting stream-bed erosion and the consequent loss of soil; and (3) increase of water supply and watering facilities.

ENFORCEMENT

Enforcement under the Rules for Administration of Grazing Districts as revised June 14, 1937, and the Federal Range Code has been maintained with satisfactory results. A large number of alleged trespasses have been investigated, trespass notices served, and trespasses abated. Many cases have been investigated for violation of the terms of licenses. Administrative officers of the Division, assisted by temporary range riders during concentrated seasonal livestock movements on the range, have been successful in promoting orderly migration of stock over designated routes. Enforcement has been and is mainly a matter of education and understanding. One of the principal accomplishments to be achieved is the prevention of a violation rather than the arresting of a violator after it has occurred, and, in this particular, results obtained were extremely satisfactory.

HEARINGS AND APPEALS

During the year 1938, 20,752 applications for grazing licenses were filed with the regional graziers. These applications were considered by the regional graziers, and action was taken in accordance with the provisions of the Rules for Administration of Grazing Districts and the Federal Range Code. That action taken was satisfactory in the great majority of cases is indicated by the fact that appeals were filed in only 420 cases which represents a very small percentage of the number of applications considered. A number of these appeals have been withdrawn or adjusted without formal hearings. Hearings have already been held before an examiner in a large number of cases, and

others are being set for hearing as rapidly as possible to the end that the grazing rights of the parties involved may be determined at an early date.

HIGHLIGHTS OF PROGRESS IN THE VARIOUS REGIONS

Many of the accomplishments that essentially require careful ground work and continued activity from year to year were realized in the various regions during the year. Some of the high lights of the accomplishments include the following:

Utah, Region 2

Funds returned to grazing districts out of grazing fees collected afforded the construction of 125 improvement projects on the public lands in the region.

Only 37 wilfull trespasses were committed, a gratifying record considering that the range in this region is used by approximately 5,000 licensees.

Complete appraisals of nearly 300 ranch set-ups, dependent on the use of the public range in one district, placed that district in a position to go on a term-permit basis in the near future. Inventory of properties and range carrying-capacity studies in other districts progressed at a satisfactory pace.

The range improvement program to cover the next 4 years of activity was designed during the year.

Nevada-California, Region 3

Satisfactory progress was made during the year in subdividing natural units of the 35-million-acre public-range area of this region into group and individual allotments.

About \$5,000 worth of equipment for water development was purchased from the 25 percent fund returned to the California districts. Moneys for improvement under this fund in Nevada were tied up in litigation. Materials included pipe, windmills, troughs, and fence wire. Installation and construction were performed by C. C. C. enrollees.

Difficulties of administration of "checkerboard" lands, located in alternate ownership by the United States and the Southern Pacific Land Company and occupying a 40-mile strip across northern Nevada, were greatly minimized by satisfactory allotment through continued cooperative arrangement and agreement among all concerned.

Oregon, Region 4

In executing an agreement entered into during the year between the Division of Grazing and the State land board and several counties,

stockmen of Oregon leased 1,000,000 acres of State and county land in grazing districts and turned it over to the Division of Grazing to administer.

About 500 unclaimed wild horses were removed from grazing districts after being rounded up on the range by aeroplane and disposed of in accordance with State law and rules of the range.

Three carloads of wire were purchased, 150 miles of stock driveway posted, 3 stock bridges built, 45 reservoirs and 40 springs were developed out of funds returned to grazing districts from fees collected.

Idaho, Region 5

A preliminary survey of wildlife that inhabit grazing districts in Idaho resulted in a census estimate of the following numbers and species of game and birds in the four Idaho districts: 10,000 deer, 1,500 elk, 800 mountain sheep, 700 mountain goats, 7,000 antelope, 400 moose, 15,000 sage chickens, and 8,000 grouse.

Two hundred dependent ranch set-ups were classified and rated. Cooperation with Federal and State agencies resulted in the construction of a 7-mile drift fence, posting of 50 miles of stock driveway, suppression of 11 major fires on public land, and the transplanting of 800 beavers from areas where they were short of food or where they were more or less a nuisance to small public-domain stream beds where already they have contributed an inestimable value to conservation of water and soil.

New Mexico, Region 7

Funds returned to grazing districts from fees collected afforded the purchase of poison mix for rodent extermination and material for cattle guards on important stock trails. Enrollees of C. C. C. camps furnished the labor, and the program was given enthusiastic support of stockmen. This is a real conservation activity. Certain rodent species in the Southwest are known to store 20 to 40 pounds of grass seed in each colony den.

Practically all licensees in the region are now operating on individual allotments. A total of 1,967 allotments have been set up with ample provision for the needs of Indians residing in grazing districts.

Colorado, Region 8

Grazing officials invited groups of stockmen affected to accompany them out on the range to subdivide equitably the districts into group and individual allotments. That satisfactory results were obtained through this "home rule" method is evidenced by the following: Colorado district No. 2 is broken down into 15 common-use and 111 individual allotments. Ninety percent of the users in Colorado districts Nos. 3 and 4 are operating in group and individual allotments.

Colorado district No. 6 has been subdivided into 9 common-use and 123 individual allotments. This allotment system which prevents the unnecessary movements of livestock in grazing districts is a tremendous advance in conservation.

Arizona, Region 9

The Division of Grazing, the Forest Service, and the Indian Office (three major land-management agencies in Arizona) have by agreement inaugurated a comprehensive system of fire prevention and control on public lands of the State.

Through cooperation with the Biological Survey, 74,820 acres of Federal range were treated for rodent extermination.

The 25 percent of fees collected furnished the means for constructing 8 stock corrals, 25 miles of fence, and 11 miles of stock driveway boundary.

The Arizona "strip" was agreeably subdivided for use into four individual and five community range allotments.

Complaints of serious trespass are rare in Arizona due to the allotment of definite range areas and the fact that proper use of the range is primarily dependent upon privately developed stock water which actually governs the area of range that can be used.

Wyoming, Region 10

Adherence to a suitable standard for measuring the amount of public range forage to which applicants with dependent property would be entitled resulted in the elimination of 50,000 sheep and 10,000 cattle from the public range. This apparent herculean task was accomplished without any of the affected stock growers requesting a hearing on his case.

Grazing districts were subdivided into administrative units and the land-ownership break-down in each unit was tabulated, which simplified the problem of livestock distribution and assisted in obtaining practical agreeable estimates of range carrying capacity, pending the accumulation of scientific data. In this practically new region, violations of the rules were exceptionally few, only six being reported.

DIRECTOR OF FORESTS

Lee Muck, Director

THE Office of Director of Forests of the Department of the Interior was established May 18, 1938, by Departmental Order No. 1283.

This office was created to promote a unified policy of forest conservation on all lands under the jurisdiction of the Department of the Interior. These lands and their forests involve a wider range and a greater variety of prudent use than those under the jurisdiction of any other agency of the Federal Government.

A brief list of characteristic forest lands under the jurisdiction of the Department of the Interior shows the complexities, and at the same time the necessity of a coordinated forest policy, involved in the conservation administration of these lands.

In the national parks the preservation of the primeval forests are the first consideration. Not only are the forests in the national parks preserved for their inspirational and recreational use by all of the people of the country, but they form a natural wildlife reservoir and laboratory of increasing importance to ecologists.

At the other extreme in prudent use the Department of the Interior is responsible for the businesslike management of forests on the revested and reconveyed grant lands of Oregon where timber cutting must be developed under principles of sustained yield management.

Among the new and larger forest responsibilities of the Department is the planning of the administrative organization, the field projects of and activities on the revested and reconveyed Federal forest land aggregating 2,213,988 acres located in 18 counties in western Oregon and locally called "O and C lands." This term, as used locally, means the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands. According to the Federal forest survey in 1934, the total timber volume on these lands was 46,235,923,000 board feet. Their economic and social importance, both locally and nationally, places them in the front rank of American forests.

In 1937 a new start was made to provide these lands with a sound progressive plan of administrative management, with emphasis on

the business aspects of forestry. The act of August 28, 1937, authorized and outlined a plan of sustained yield management for a specific Federal forest property for the first time in American forestry law. Moreover, this act authorized the Secretary of the Interior to make cooperative agreements with other Federal and State agencies and with private owners and operators for the coordinated administration of forest units on the revested and reconveyed lands in conjunction with other public forests and lands in private ownership, when such action will facilitate sustained yield management. Another section of the act authorizes similar cooperation by the Secretary of the Interior in formulating forest plans and practices and for forest fire protection work.

For the first time in American forestry, legislative authorization has been given for the creation and development of cooperative sustained yield units which may comprise forest lands under the jurisdiction of Federal and State agencies and private forest owners and operators. This is an entirely new kind of cooperative undertaking in American forestry, and it will provide a new approach to the practice of forestry in the United States.

Under the law of August 28, 1937, 75 percent of the gross income received from sales on the revested and reconveyed lands of Oregon must be returned to the counties of the State of Oregon and the Treasury of the United States, leaving 25 percent for the administration of the forests under appropriation by Congress. This requires forest planning within forest income so that the principles of sustained yield management may be carried out on a self-supporting basis. Not only is the policy of sustained yield of vital importance to the Nation, it is absolutely necessary to assure a continued existence of communities dependent on the continuing flow of timber into the channels of commerce.

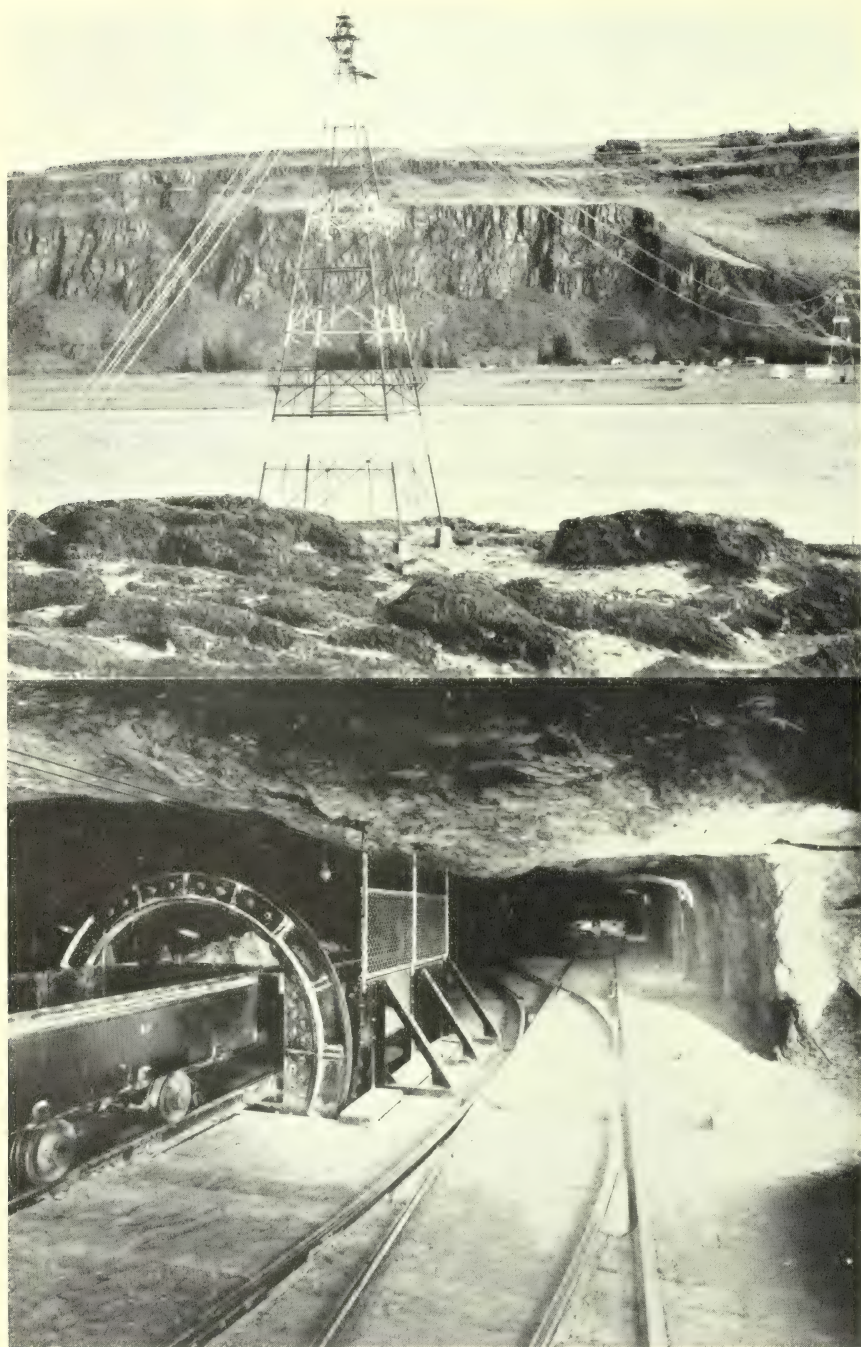
In addition to the intensive development for industrial advancement in the revested and reconveyed lands of Oregon, the Department of the Interior has the responsibility for conservation of Indian timber lands. Of the receipts from the sale of timber on Indian lands, 92 percent is returned to the Indians. Past experience has shown conclusively that sustained yield management is not only feasible and economically effective but that it is possible even under extraordinarily low administrative costs.

In addition to the primeval forests of the national parks and the commercial forests on the Oregon revested and reconveyed lands and on the Indian lands, there are forests on the public domain in the United States and Alaska under the jurisdiction of the Department which are managed primarily for watershed protection purposes.

Generally speaking, each of these types of forests present different problems of administration and conservation. However, many

forestry techniques, such as fire protection and insect control, and basic forestry principles apply to all these forests. Particularly is this true of the policy of conservation, a policy seeking the highest wise use for the greatest number of the people of the country within the limits set by congressional legislation.

Consequently, the establishment of the Office of Director of Forests in the Department of the Interior to promote a unified policy of forest conservation, forest planning and forestry management is not only a progressive step forward in general conservation, but it is in keeping with the basic principles of modern administration.



UPPER: MEASURING CABLE ON THE COLUMBIA RIVER.
LOWER: A POTASH MINE NEAR CARLSBAD, N. MEX.

GEOLOGICAL SURVEY

W. C. Mendenhall, *Director*

BASICALLY important in the general program of conservation and development were the results of the Geological Survey's work during the fiscal year 1938. Investigations of the Nation's mineral and water supplies were conducted with all possible vigor and dispatch, thousands of square miles were surveyed for topographic maps, and technical supervision was given to prospecting, mining, and producing operations on public and Indian lands. This work was accomplished through the use of the regularly appropriated funds, the co-operative funds from States, counties, and municipalities, the funds transferred from other departments of the Government for types of work within the Survey's field, and the emergency funds derived chiefly from the Public Works Administration and devoted largely to mapping of various types and to studies of floods. The aggregate expenditures amounted to \$5,248,000, which was \$265,000 less than the amount expended during the preceding year.

More than 3,600 analyses and tests of mineral and rock samples were made, including more than 1,100 for persons not officially connected with the Geological Survey.

New area to the extent of 13,500 square miles was surveyed in the field topographically. This work will yield contoured topographic maps of 198 areas in 35 States and in Puerto Rico. In addition, by the aid of aerial photography, 2,077 square miles was surveyed in four States for the production of planimetric maps without contours.

Fifty-six book publications of the Survey's regular series, and 23 pamphlets and circulars, aggregating more than 8,900 pages of printed matter, dealing with geology, mineral resources, and water supplies, were issued during the year, and about 822,000 copies of 312 topographic and other maps were printed. The geologic map of the Front Range, Colo., was prepared.

There were 63 geologic parties in the field in 35 States and Alaska. The field investigations on several continuing projects were completed, and work was begun on new projects, including geologic studies of areas in Idaho, Nevada, Colorado, and New Mexico. The

geologic investigation of the platinum deposits at Goodnews Bay, Alaska, which now form the principal domestic source of platinum metals in the United States, was completed.

Measurements of stream flow were maintained at 3,831 stream-gaging stations. All the States, the District of Columbia, and Hawaii are affected by this work. Flood studies were continued during the year. Analyses were made of more than 2,400 samples of underground or surface waters to determine the suitability of the waters for industrial, agricultural, or domestic uses.

In the administration of the land-classification and mineral-leasing activities of the Survey more than 15,000 reports were made on cases requiring an expression of opinion and advice. Mineral production during the year from public and Indian lands and naval petroleum reserves under supervision of the Survey had an estimated value of \$88,500,000, and revenue received by the Government as a result of this production amounted to about \$9,750,000. This revenue and the conservation of the mineral resources involved were attributable, both directly and indirectly, to supervision by the Survey, which insures orderly and complete development of those resources.

An allocation of \$2,690,000 from the Public Works Administration for scientific and engineering work, but chiefly for topographic mapping, will bring the total funds available for 1939 close to \$7,500,000, and the Geological Survey looks with high hope to the work that can be accomplished for the public good.

GENERAL SUMMARY OF THE YEAR'S ACTIVITIES

Geologic work.—Sixty field parties were active during the year, and work was done in 35 States. Work continued throughout the year in metal mining districts of Colorado, Idaho, New Mexico, the oil and gas region of Kansas, and in the Carboniferous areas of Illinois, in cooperation with the States. Physiographic and geologic studies were continued in the Yosemite, Sequoia, and Zion National Parks in cooperation with the National Park Service. Cooperation was also continued with the American Petroleum Institute. Several major projects begun in 1937 or earlier were continued, and those on the Colorado Front Range, the Metairie mining district, Washington, the La Plata district, Colorado, and on the Pottsville flora of Illinois, were completed. New projects include the mineral resources of Kootenai County, Idaho, in cooperation with the State, a geologic and geophysical investigation of the ore deposits of the Austin district, Nevada, geology and mineral resources of the Duck Valley Indian Reservation, Nev., for the Office of Indian Affairs, the Chattanooga and Gold Hill mining districts, Colorado, and the Big Hatchet Mountains, N. Mex. Work for other Federal bureaus included examinations of dam sites for the Corps of Engineers, work in the Yosemite and Sequoia National Parks, Calif., and in the Zion and Bryce Canyon National Parks, Utah, the examination of mineral deposits for the Tennessee Valley Authority, and special geologic investigations for the Public Health Service and for the Department of Justice. More than 3,600 analyses and tests of mineral and rock samples were made, including 1,147 for persons not officially connected with the Survey. Tests of bleaching clays and temperature measure-

ments of deep wells were continued. Mathematical tables for calculating temperatures were prepared, contributory to a long study of geothermal methods for estimating the age of the earth which is nearing completing.

Explorations in Alaska.—During the field season of 1937 five field projects were carried on by the Alaskan branch of the Geological Survey. Of these three were concerned principally with geologic investigations relating to the mineral resources of the Territory and two were primarily topographic. For the field season of 1938 six field projects had been started before the end of the fiscal year 1937-38 and one additional field project was to be undertaken as soon as practicable. All of these field projects will be continued throughout the open season as late as conditions permit. Other work included the usual collection of statistics regarding the production of mineral commodities, the answering of many inquiries relating to the mineral resources of the Territory, and office and laboratory studies required to prepare the results of the field surveys for publication.

Topographic mapping.—The area covered by new topographic surveys, re-surveys, and revision amounted to 13,583 square miles, which comprises the entire area or portions of 198 topographic maps with contours. Topographic mapping was done in 35 States and in Puerto Rico. Cooperation was had with 16 States, Puerto Rico, and the Tennessee Valley Authority. The area covered by planimetric maps without contours, resulting from aerial photography, covered 2,077 square miles in 4 States. By a cooperative agreement with the Tennessee Valley Authority, the Geologic Survey mapped from aerial photographs by stereophotogrammetric methods 1,168 square miles covering in whole or in part 29 quadrangles. Fifteen stereophotogrammetric instruments have now been installed at the Chattanooga office of the Geologic Survey. The aerial photographic method of mapping is gaining in favor. There are many areas in the United States in which this method could be applied most economically. In addition to the routine adjustment of primary control, there has been in progress a general adjustment of both horizontal and vertical control to agree with the standard datums of the United States. During the year eight bulletins reporting the results of control surveys have been prepared, and three that were previously prepared were published. The office work on river surveys that were made by the Conservation Branch is steadily progressing. The maps of 28 projects, comprising 114 sheets, were sent forward for reproduction during the year. The preparation of the transportation map of the United States, in sections, for the Bureau of Public Roads, was continued, and maps of 5 States, comprising 38 sheets, were published. Work on the United States portion of the map of the world on the scale of 1:1,000,000 was resumed. One hundred and sixty maps were prepared for photolithographs and 97 for engraving, and 212 maps were prepared for reprinting. An exhibit comprising 40 maps was prepared and sent to the International Geographic Congress at Amsterdam, Netherlands.

Investigation of water resources.—The water-resources branch collected and made available for publication stream-flow records at 3,831 river-measurement stations in the 48 States, the District of Columbia, and the Territory of Hawaii, obtaining this authentic information on the behavior of streams in drought, in flood, and in normal conditions—information that is invaluable for intelligent planning of projects for use or control of the surface water supply. It investigated underground water supplies in 34 States and in Guam, Hawaii, and the District of Columbia and obtained basic information on the occurrence, quantity, and quality of underground water supplies which is essential for the development, conservation, and use of ground water upon which a large part of the population of the country must depend. Investigations of stream-flow and silt movement of streams in seven projects of the Soil Conservation Service, and similar studies on the Colorado River, have also been continued. Analyses, partial or complete,

were made of 2,474 samples of water from surface and underground sources with reference to the suitability of the waters for industrial and agricultural uses and for domestic use (aside from questions of health), so far as such use is affected by the dissolved mineral matter. The annual report on the capacity of water wheels in water-power plants in the United States of 100 horsepower or more on January 1, 1938, was compiled. Engineers of the branch had field supervision of operation under permits and licenses of the Federal Power Commission in connection with 155 projects. Investigations of the water problems along the international boundary between the United States and Canada were continued for the State Department. The collection of information on recent outstanding floods was continued.

Classifying public land and supervising mineral leases.—The conservation branch made 15,509 formal findings of technical fact involving the mineral resources, water power, or storage possibilities of public land; added 97,583 acres to outstanding water-power reserves and eliminated 5,890 acres therefrom; defined the known geologic structure of 1 producing oil and gas field involving 1,391 acres; completed 32 miles of river-utilization surveys and surveyed in detail 4 dam sites in public-land States; prepared 3 reports based on geologic and geophysical studies of formation materials and conditions at dam sites; administered activities and operations under 155 power projects licensed by the Federal Power Commission and 172 permits and grants from the Department of the Interior; supervised on public land 8,605 oil and gas holdings involving 4,334 productive wells and 731 coal properties, 39 potash properties, 66 sodium properties, 27 sulphur properties, 11 phosphate properties, and 1 oil-shale property involving 526 productive mines; assisted hundreds of oil and gas permittees and operators in preparation of unit plans of development and operation; classified approximately 7,800 outstanding oil and gas prospecting permits under the extension provisions of the act of August 26, 1937 (50 Stat. 842); supervised on naval petroleum reserves 22 leaseholds involving 519 productive oil and gas wells; and on Indian land 5,382 leaseholds involving 4,407 oil and gas wells, 235 mining properties involving 44 lead and zinc properties, 142 coal properties, and 49 other mineral properties; issued the revised coal operating regulations, effective December 23, 1937; changed territorial delineation of the three oil and gas supervisory districts and created a fourth supervisory district with headquarters at Roswell, N. Mex.

Publications.—The publications of the year consisted of 56 reports in the regular series and 23 pamphlets and circulars for administrative use, a total of 8,910 pages; 110 new or revised topographic and other maps and 202 reprinted maps. Among the book publications were reports on the geology of the Yukon-Tanana region, Alaska; the geology and mineral resources of areas in Colorado, Idaho, and Oregon; spirit leveling in Kansas, Missouri, and Vermont; records of water levels and artesian pressure in observation wells in the United States in 1936; ground water in south-central Nebraska and in areas in Arizona, Texas, and Utah; the thermal springs of the United States; the warm springs of Georgia; the floods of March 1936 in the eastern United States and floods in California and Texas; and several paleontologic papers. A revision of the operating regulations to govern coal-mining methods and the safety and welfare of miners on leased lands on the public domain was also issued. Besides these printed reports 24 brief papers were issued in mimeographed form as memoranda for the press or as informative circulars.

The engraving and printing division printed more than 822,000 copies of maps and did repay work amounting to about \$195,000 for 72 other units of the Federal and State Governments.

NOTE.—Detailed tabular statements are given at the end of the report.

GEOLOGIC BRANCH**SUMMARY**

Sixty field parties were active during the year, and work was done in 35 States. Work continued throughout the year in metal mining districts of Colorado, Idaho, New Mexico, the oil and gas region of Kansas, and in the Carboniferous areas of Illinois, in cooperation with the States. Cooperative investigations with the American Petroleum Institute were continued. Physiographic and geologic studies were also continued in the Yosemite, Sequoia, and Zion National Parks in cooperation with the National Park Service. Several major projects begun in 1937 or earlier were continued and those on the Colorado Front Range, the Metaline mining district, Washington, the La Plata district, Colorado, and on the Pottsville flora of Illinois, were completed. New projects include the mineral resources of Kootenai County, Idaho, in cooperation with the State, a geologic and geophysical investigation of the ore deposits of the Austin district, Nevada, geology and mineral resources of the Duck Valley Indian Reservation, Nev., for the Office of Indian Affairs, the Chattanooga and Gold Hill mining districts, Colorado, and the Big Hatchet Mountains, N. Mex. Work for other Federal bureaus included examinations of dam sites for the Corps of Engineers, work in the Yosemite and Sequoia National Parks, Calif., and in the Zion and Bryce Canyon National Parks, Utah, the examination of mineral deposits for the Tennessee Valley Authority, and special geologic investigations for the Public Health Service and for the Department of Justice. More than 3,600 analyses and tests of mineral and rock samples were made, including 1,147 for persons not officially connected with the Survey. Tests of bleaching clays were continued and aided further in placing an important paying industry on a firm foundation. Temperature measurements of deep wells were continued, and mathematical tables for calculating temperatures were prepared, contributory to a long study of geothermal methods for estimating the age of the earth, which is nearing completion.

WORK OF THE YEAR BY STATES

Alabama.—Additional field work was done in the Greasy Cove area, Etowah County, in connection with a study of iron ore in the Red Mountain formation in northeastern Alabama, and the investigation of the brown iron ore in the Russellville district was continued. Stratigraphic examinations were made of the Upper Cretaceous and Tertiary formations. An investigation for the Public Health Service was made of geologic and ground-water conditions in Coffee County, to determine their possible influence on the prevalence of tuberculosis.

Arizona.—Investigations were made of the geology and ore deposits of the Benson and Pearce quadrangles and of the manganese deposits in the Artillery Peak Mountains. A report on the ore deposits of the Tombstone district, prepared in cooperation with the Arizona Bureau of Mines, was transmitted to that

bureau for publication. Progress was made on reports on the geology and mineral resources of the Tucson quadrangle and on the geology and ore deposits of the Ajo quadrangle.

Arkansas.—A field study was made of quartz veins and some mineral deposits of Magnet Cove, Crystal Mountains, and other areas in western Arkansas. Papers on volcanic activity at Magnet Cove, taeniolite from Magnet Cove, unweathered manganese deposits of the Batesville district, and Pennsylvanian sedimentation in the Arkansas coal field were submitted for outside publication, and a paper on the influence of structure in localizing ore in the quicksilver deposits of southwestern Arkansas was submitted to the National Research Council. Bulletin 886-C on the geology and ore deposits of the southwestern Arkansas quicksilver district was issued. Reports on the fauna and stratigraphy of the Morrow group of Arkansas and Oklahoma, on recent developments in the Batesville district manganese deposits, and on the geology of the Fort Smith district are in preparation for official publication.

California.—A comprehensive report on the general geology, physiography, paleontology, and stratigraphy of the Kettleman Hills oil field and a report on the geology and ore deposits of the Grass Valley region are in process of publication. Studies of the Foraminifera of the Kreyenhagen shale of Garza Creek; stratigraphy, structure, and petrology of the siliceous rocks of the Monterey formation; the geology of the San Andreas Rift; the east front of the Sierra Nevada with regard to problems of the age of the fault escarpment; and the geology and mineral resources of the Death Valley region and of the Elsinore, San Luis Rey, and Corona quadrangles were in progress. Field investigations of the geologic structure, stratigraphy, and oil resources of the lower Tertiary strata in Reef Ridge in the Kettleman Plains and the Dudley No. 2 quadrangle in the Coalinga region, and of the geology and mineral resources of the Palos Verdes Hills, including a study of the Wilmington oil field, were completed. To obtain data for a study of source beds of petroleum, oil centers in California were visited. In cooperation with the National Park Service a geologic reconnaissance of the northwestern part of Yosemite National Park was continued. Papers were submitted for outside publication on the calcium carbonate content of some Mesozoic and Tertiary sediments, vein filling at Nevada City, arsenic from gold quartz veins of Grass Valley, and copper deposits in serpentine in southwestern Oregon and northwestern California as illustrated by the Cowboy mine.

Colorado.—The program for investigation of some mining regions in the State in cooperation with the State of Colorado and the Colorado metal mining fund was continued. Field studies of the Ouray district in the San Juan region, of the Cripple Creek district, and of districts in the La Plata Mountains were completed. Other studies were made in the Gold Hill mining district, in the Idaho Springs and Central City districts in the Front Range, and in the Chattanooga and Kokomo-Robinson districts. A paper on copper ores of the La Plata district and an explanatory text to accompany the geologic map of the Front Range mineral belt were submitted to the Colorado Scientific Society for publication. Other papers to be published outside were prepared on the Laramide igneous sequence and differentiation in the Front Range, stoping and assimilation in a granodiorite stock at Jamestown, and the Leadville district (National Research Council). A memorandum for the press was issued on platinum metals in a Colorado copper district. Progress was made on reports on the geology and ore deposits of the Ouray district, the Front Range, the La Plata district, the Jamestown mining district, the Kokomo-Robinson district, the Cripple Creek district, the Gold Hill mining district, and on the Nederland tungsten deposits, Paleozoic stratigraphy in the Sawatch Range, and the geology and mineral resources of the west slope of the Mosquito Range. Non-cooperative investigations

in the State consisted of completion of field studies in the Yampa coal field, in northwestern Colorado. A report on the alkaline rocks of Iron Hill was submitted for official publication, and papers on plagioclase and orthoclase feldspar from the Tertiary rocks of the San Juan region for outside publication. A report on the geology and mineral resources of the Snowmass Mountain area was published as Bulletin 884.

Florida.—A study of the physical geography of the State in cooperation with the Florida Geological Survey is in progress. A geophysical survey was made across the peninsula in north-central Florida, and stratigraphic and paleontologic studies were made of the Tertiary formations of the State and on the gastropods of the Alum Bluff group. A report on phosphate investigations in 1934–35 was completed for official publication. A paper on the molluscan fauna from the upper bed at the A. L. Parrish farm, Washington County, with notes on the Foraminifera from the upper and lower beds at the same locality, was submitted for outside publication.

Georgia.—The detailed areal mapping and study of ore deposits in the Cartersville district and the investigation of the geology of the Coastal Plain of Georgia, in cooperation with the Division of Mines, Mining, and Geology of Georgia, were continued. A reconnaissance study was made of the Upper Cretaceous formations of the State for the purpose of correlating these formations with those of Mississippi and Alabama. A report on the warm springs of Georgia and their geologic relations and origin was published as Water-Supply Paper 819. A paper on stratigraphy of the Coastal Plain of Georgia was published in the Bulletin of the American Association of Petroleum Geologists.

Hawaii.—A geophysical survey in the Hawaiian Islands was undertaken for the purpose of determining water supplies.

Idaho.—Cooperation with the Idaho Bureau of Mines was continued in studies of geology and ore deposits of the Dixie mining district, the placer deposits of central Idaho, the dry belt of the Coeur d'Alenes, the mining district in Kootenai County, the Atlanta-Rocky Bar mining district, the Florence mining district, and the Boise Basin. A report on geology and ore deposits near Murray was transmitted for publication by the Idaho Bureau of Mines, and papers on structural setting of veins in the Elk City and Warren districts and influence of structure in localizing ore in the Boise Basin were submitted to the National Research Council. Noncooperative projects consisted of a reconnaissance of physiography and glacial geology of eastern Idaho and detailed mapping of the geology and mineral resources in the Borah Peak, Irwin, Ammon, and Paradise Valley quadrangles. Bulletin 877 on the geology and ore deposits of the Bayhorse region, Custer County, was issued.

Illinois.—Cooperation with the Illinois Geological Survey in the study of the Pottsville flora of the Eastern Interior Basin was continued, and studies of the Fusulinidae of the Pennsylvanian series in Illinois were in progress. A paper on the origin of the bedding replacement deposits of the Illinois fluorspar field was prepared for outside publication.

Indiana.—A preliminary account of the flora of the New Albany shale of Indiana and Kentucky was submitted for outside publication. A paper on gastropods from the Spergen formation is in preparation. The report on the Pottsville flora of the Eastern Interior Basin is mentioned under Illinois. A study of Devonian fossils and stratigraphy is mentioned under Michigan.

Kansas.—In cooperation with the Geological Survey of Kansas, investigation of the subsurface Mississippian rocks was continued and a study of subsurface rocks of pre-Chattanooga age was begun. A temperature investigation of shallow shoestring sand pools in southeastern Kansas and northeastern Oklahoma and

geophysical observations in oil and gas districts of eastern Kansas were made. A paper on oil and gas resources of western Kansas was submitted to the American Association of Petroleum Geologists and one on Mississippian rocks of Labette County to the Kansas Geological Survey for inclusion in a State report on that county. Studies of source beds in Kansas and of the lead and zinc deposits of southeastern Kansas included in the Tri-State district are mentioned under Oklahoma.

Kentucky.—A report on additions to the Wilcox flora from Kentucky and Louisiana was completed for official publication. Work on the Pottsville flora of the Eastern Interior Basin is mentioned under Illinois. Preliminary account of the flora of the New Albany shale is mentioned under Indiana. A study of Devonian fossils and stratigraphy is mentioned under Michigan.

Louisiana.—A revised edition of the map of Louisiana, showing oil and gas fields, salt domes, and prospects, was prepared. A report on the Wilcox flora is mentioned under Kentucky.

Maine.—A study of the granites on Crotch and Deer Islands in the Stonington district was made in connection with a study of commercial granites and mapping granite quarries in New England.

Maryland.—In informal cooperation with the Maryland Geological Survey a geologic map with structure sections of Frederick County, including parts of Carroll and Washington Counties, was transmitted to the Maryland Geological Survey. Geophysical investigations in the Soldiers Delight and adjacent area were continued.

Massachusetts.—Study of commercial granites and mapping granite quarries in New England included granite areas in Massachusetts.

Michigan.—The resistivity survey of some oil districts near Lansing by members of the geophysical section in cooperation with the Department of Conservation of the State of Michigan was completed and the report transmitted to the State for publication. Studies of Devonian fossils and stratigraphy in Michigan, Indiana, Kentucky, and Ohio were continued.

Mississippi.—Studies of the stratigraphy of the Upper Cretaceous deposits and of the geology of the Jackson gas field were continued, and a paper on the State's deep test well in the Jackson gas field was sent to the Mississippi Geological Survey for publication.

Missouri.—A report on the stratigraphy and fauna of the Louisiana limestone of Missouri was transmitted for publication, and work on a paper on the Warsaw fauna of the Joplin district was continued.

Montana.—General reconnaissance studies of the physiography and glacial geology of portions of western Montana, northwestern Wyoming, and eastern Idaho, detailed studies of the geology and the coal, gas, and oil resources of the Little Rocky Mountains and adjacent areas, and an investigation of scarps and other evidences of Pleistocene and Recent faulting in southwestern Montana were continued. Field examinations of geologic structure and fuel resources of a part of Carbon County and of the geology and coal resources in the Otter Creek area, Powder River, Rosebud, and Big Horn Counties, were begun. An examination of the Willow Creek dam site in the Crow Indian Reservation near Billings was made for the Office of Indian Affairs. Reports for official publication on the geology and mineral resources of the Black Hills rim, in Montana and Wyoming, and of the Libby quadrangle, and on fossil plants from the Fort Union and associated formations in Montana, North Dakota, and Wyoming, were in progress. Papers were submitted for outside publication on amphibolization of sills and dikes in the Libby quadrangle, on the influence of structure on ore deposits in the Libby quadrangle, on structural features of the Flathead mine, and on Kinderhook conodonts from the Little Rocky Mountains.

Nevada.—Field and office work on the projects covering the general geology and ore deposits of the Hawthorne and Tonopah quadrangles, the Comstock lode at Virginia City, and the structure of the Basin Range, were continued. A study of the Austin or Reese River district was begun. Geophysical studies were made in the Austin and Spring Valley districts. An examination of ore deposits in the Duck Valley Indian Reservation was made for the Office of Indian Affairs. A paper on Mesozoic stratigraphy of the Hawthorne and Tonopah quadrangles, was submitted for outside publication.

New Hampshire.—In connection with an investigation of the granites of New England, studies were made of the granite districts in New Hampshire.

New Jersey.—A report on pre-Cambrian geology and mineral resources of the Delaware Water Gap and Easton quadrangles, New Jersey and Pennsylvania, was transmitted for official publication.

New Mexico.—The study of the geology and ore deposits of the Little Hatchet Mountains conducted in cooperation with the New Mexico Bureau of Mines was continued. A paper on the outlook for new ore discoveries in the Little Hatchet Mountains was submitted for outside publication. A field examination of the geology and the coal, oil, and gas resources of the eastern side of the San Juan Basin in Rio Arriba County was continued. Official reports covering this and earlier investigations, including a study of the Lumberton-Monero district, were in progress and also one on the Potash special quadrangle. A preliminary map showing geologic structure of part of Rio Arriba County was published. A correlation chart for the Permian of western Texas and southeastern New Mexico, and a short summary of the influence of structure in localizing ore in the Ground Hog mine, central district, were prepared for the National Research Council. A paper on a newly discovered section of Trinity age in southwestern New Mexico was prepared for the American Association of Petroleum Geologists.

New York.—A report on talc in the Gouverneur district, the field work for which was done several years ago on an allotment from Public Works Administration is nearing completion for official publication. A paper on some Psilophytales from the Hamilton group in western New York was prepared for outside publication. Bulletin 899—A on structure and gas possibilities of the Oriskany sandstone in Steuben, Yates, and parts of the adjacent counties, was issued.

North Dakota.—A report on the geology and coal resources of the Minot area is in course of publication. Work on the Fort Union and associated formations is mentioned under Montana.

North Carolina.—A report on gastropods from the Miocene and lower Pliocene of Virginia and North Carolina, with summary of stratigraphy, was completed for official publication.

Ohio.—A study of the stratigraphy and fossils of the Devonian of Michigan and Ohio was continued. A study of the stratigraphy and faunas from the Devonian and Carboniferous formations is mentioned under Pennsylvania.

Oklahoma.—The investigation of the geologic structure, stratigraphy, and petroleum possibilities in the Ouachita Mountains was extended. Preparation of reports on subsurface geology and oil and gas resources of Osage County was continued, and those covering Tps. 22 and 23 N., Rs. 8, 9, 10, and 11 E., and Tps. 24 and 25 N., Rs. 8 and 9 E., are in course of official publication. In the investigation of the lead and zinc deposits of the tri-State area, mapping the geologic structure and stratigraphy and study of the mines of the Oklahoma and Kansas portions of the district were continued. Reports on stratigraphy and fossils of the Moorefield formation and of the Morrow group of Arkansas and Oklahoma were in progress. A new edition of the map of the oil and gas fields of Oklahoma is in preparation. In connection with a comprehensive study of source beds of petroleum conducted in cooperation with the American Petroleum Institute,

localities in Oklahoma and Kansas were visited. A paper on some studies of source beds in Oklahoma and Kansas and a paper on the Verden sandstone of Oklahoma—an exposed shoestring sand of Permian age—were published by the American Association of Petroleum Geologists.

Oregon.—A report on the geology of a part of the Wallowa Mountains was transmitted to the Oregon State Department of Geology and Mineral Industries for publication, and a paper on the geology of the Salem Hills and the North Santiam River is in preparation for publication by the State. A preliminary geophysical investigation of the Sourdough chromite deposits in Oregon was made for the State Department of Geology and Mineral Industries. Bulletins 875 (Nonmetallic mineral resources of eastern Oregon), 879 (Geology and mineral resources of the Baker quadrangle), and 893 (Metalliferous mineral deposits of the Cascade Range in Oregon) were issued.

Pennsylvania.—Reports on the geology and mineral resources of the Honeybrook and Phoenixville quadrangles and of the Hanover and York quadrangles have been completed for official publication. Additional field work was done in York County in connection with a report on the geology and mineral deposits of York County in cooperation with the State of Pennsylvania. A report on a dam site on Codorus Creek, York County, was made for the War Department. Studies of the regional metamorphism in the Lower Kittanning coal beds of western Pennsylvania, and of the stratigraphy and flora of the Pocono formation of Pennsylvania, Virginia, and West Virginia, were continued. A report on some linguloid shells from the late Devonian and early Carboniferous rocks of Pennsylvania and Ohio was submitted for official publication, and a paper on garnet crystals in cavities in metamorphosed Triassic conglomerate in York County and a discussion of a paper by Ralph Miller on the Martinsville limestone in eastern Pennsylvania were submitted for outside publication. Work in the Delaware Water Gap and Easton quadrangles is mentioned under New Jersey.

Southern Appalachians.—The report on gold deposits of the southern Appalachians, including areas in Virginia, North Carolina, South Carolina, Georgia, and Alabama has been submitted for publication.

Tennessee.—Field work for revision of the mapping of the Knox dolomite of the Mascot-Jefferson City district in east Tennessee and for a study of the manganese deposits of Perry County was carried on in cooperation with the Division of Geology of the Tennessee Department of Conservation. Investigations of geologic and ground-water conditions in Giles County were made for the Public Health Service to determine their possible influence on the prevalence of tuberculosis.

Texas.—Reports were in preparation on the structure, stratigraphy, and fossils of the Navarro group, and on the stratigraphy, geomorphology, and structure of the southern Guadalupe Mountains. Field work was continued in a study of the geology of the Sierra Diablo region, west Texas, and in a study of the stratigraphy and fossils of the Eocene of southeastern Texas, and stratigraphic and paleontologic investigations of the Carboniferous and Permian formations of central Texas were made. A resistivity survey for the purpose of obtaining additional information as to the effects of faults and salt-water boundaries was made in the vicinity of El Paso. Professional Paper 187, on the geology of the Marathon region, was completed. A report on a new Upper Cretaceous rudistid from Texas and on fossils from the Eocene of the Gulf province and a revision of the map of the oil and gas fields of Texas are in process of publication. A correlation chart of the Permian of Texas and southern New Mexico was prepared for the National Research Council. Papers were prepared for outside publication on paleogeography and correlation of the west Texas Permian, a new taxodont genus from the Upper Cretaceous of Texas, and tectonics of the Guadalupe Mountain region.

Utah.—Geologic studies of a part of the Strawberry Valley with special attention to oil shale, coal, oil, gas, and phosphate; of the coal resources and oil and gas possibilities of the Hanksville-Caineville district; and detailed studies of the structure, igneous rocks, mineral resources, and physiography of the Henry Mountains; of the Marysville district, with special reference to alunite deposits; and of iron ores of Bull Valley were continued. An examination of a manganese deposit on Drum Mountain in Juab County was made and a report on these deposits transmitted for outside publication. Geologic investigations were continued of the geology and physiography of the plateau regions of Utah and in Zion and Bryce Canyon National Parks and Cedar Breaks National Monument in cooperation with the National Park Service. An examination of asphalt deposits of the Uinta Indian Reservation in northeastern Utah was made for the Office of Indian Affairs. The report on the geology and mineral resources of the Randolph quadrangle was transmitted for official publication. Outside publications included a paper on the origin of the Bull Valley iron ore deposits, comment on J. D. Forrester's paper on structure of the Uinta Mountains, and a paper on form of intrusion in the Henry Mountains.

Vermont.—The studies of commercial granites and mapping granite quarries of New England included granite areas in east-central Vermont.

Virginia.—Geologic work was conducted in the Galax, Independence, Rural Retreat, Mouth of Wilson, Mount Rogers, Max Meadows, and Speedwell quadrangles in connection with a study of the Gossan lead in cooperation with the Virginia Geological Survey. A paper on a southeastern facies of Lower Cambrian dolomite present in southwestern Virginia was sent to the Virginia Geological Survey for publication. Field investigations were made in the Appalachian Valley of Virginia in connection with a study of the Lower Paleozoic stratigraphy of the Appalachian Valley, and work on revision of a report on the titanium deposits was continued. A paper on relations between structure and ore deposition in the Titanium district near Roseland was completed for the National Research Council. Work on the Pocono flora is mentioned under Pennsylvania. Work on mollusca from the Miocene and Lower Pliocene is mentioned under North Carolina.

Washington.—Field investigation of the areal geology, mineral resources, and mines of the Metaline quadrangle, Pend Oreille County, was completed. A paper on dolomite and jasperoid in the Metaline district was transmitted for outside publication. In the later part of the fiscal year a study of the manganese deposits in the Olympic Peninsula was initiated.

West Virginia.—Work on the Pocono flora from Virginia, West Virginia, and Pennsylvania is mentioned under Pennsylvania.

Wyoming.—Areal and structural geologic mapping, with particular reference to coal and petroleum resources, of areas on the west and east sides of the Big Horn Basin was continued. Investigations of the Tertiary rocks of the Green River and Bridger Basins, and fossil syncline of southwestern Wyoming, with special reference to oil-shale beds, and of the geology and mineral resources of the Afton quadrangle were continued. A structural map of the Byron-Frannie area, Big Horn and Park Counties, was published. A report on geology and coal resources of the area south of Cody and one on the Shoshone area, Park County, are in preparation. Work in the Irwin quadrangle and on glacial geology and physiography is mentioned under Idaho. Work on the Black Hills rim and on the Fort Union and associated formations is mentioned under Montana.

General studies.—General investigations included Foraminifera of the Cretaceous formation of the Gulf Coast region, the genus *Ceratopea*, Tertiary echinoids of the eastern United States, Buliminidae, Globigerinidae, borderland problems of geology, physics, and chemistry, types and ranks of coal, source beds of petroleum, clay minerals, salt-dome cap rock, deep-sea cores from across the North Atlantic

Ocean, and a core sample from the deep-sea bottom southeast of New York City. A revision of a bulletin on microscopic determination of the ore minerals was completed for official publication. Geophysical abstracts covering the period from July 1936 to March 1938 were issued or are in course of publication.

WORK IN CHEMISTRY AND PHYSICS

Increasing attention during the past year has been given to chemical mineralogy, with special consideration of the internal structure of minerals. It is now possible to show that the physical properties of a mineral depend not only on the kinds of atoms composing it but also on their role and their arrangement in the crystal—features that can be determined by X-rays. The densities of strata, rocks, and minerals likewise, in the final analysis, are explained in the same way. It seems reasonable to expect that further study of the associations and conditions of formation of minerals will yield illuminating correlations with both their chemical composition and physical structure. Information on all the physical properties of rocks and minerals is being compiled in collaboration with the National Research Council.

During the year the stability relations of the different hydrates of sodium borate were studied further; also the optical properties of numerous minerals for many localities, including several manganese minerals, micas, sulphates from the Comstock lode, and many other minerals. Platinum and palladium were definitely identified in ore from the La Plata district, Colorado. A clay deposit in Iowa was shown to be mainly halloysite. Sodium sulphate is now being produced from a deposit in Texas, a sample of which was first identified as sodium sulphate among many samples sent in by the public for identification. Over 30 manuscripts were read critically by members of the section of chemistry and physics.

Altogether 3,636 examinations or tests of minerals and rock samples were made during the year. These included 1,147 specimens tested and identified for persons not officially connected with the Survey. There were 939 chemical analyses made for geologists and 493 similar analyses made in connection with research problems and geochemical investigations. The remaining 1,057 tests related to core samples, well cuttings, and similar materials.

Special investigations included a study of the base-exchange properties of river clays, a matter that will afford a correction of the previously calculated age of the ocean; the analysis and structural interpretation of several varieties of mica, especially taeniolite, lithiophyllite, and lepidolite, which have led to a better understanding of the relations between the different micas; elaborate mathematical studies relating to the flow of heat in the earth; the development of new methods of chemical analysis; and adjustment of estimates of the lengths of the geologic eras and periods in years, based both on geologic and radioactive evidence.

Spectrographic tests were made on many different minerals and ores, and minor constituents obtained in chemical work were more positively identified in this way. Crystallographic measurements were made of a number of minerals. Cuttings from a considerable number of wells were logged to determine the character of the strata at depth. Materials mined under royalties to the Government, such as potash, were checked as to quality and quantity. Assays were made for gold, silver, and platinum in a number of metalliferous samples.

Among minerals analyzed in the laboratory during the year were sodalite from Magnet Cove, Ark., pyrophyllite from Staley, N. C., many igneous rocks associated with ore deposits in the Western States, talc from Quebec, alunite from Nevada, potash brines from Utah and Wyoming, pumicite, oceanic clays, mica, mine waters, siderite from several mines, tetrahedrite, vermiculite, grahamite, dolomite, halloysite, trona, phosphate rock, vanadiferous sandstone, native gold and platinum, albite, rhodochrosite, alunogen, and other similar substances.

A monograph on bleaching clays was completed, covering their geographic and geologic distribution, their physical and chemical properties, and their processing, rating, and testing. This summarizes 8 years of intensive work and puts an important key industry on a firm foundation. All lubricating oils, most fats and waxes, many paint oils, all medicinal oils, and much sulphur are processed with bleaching clay. For this work over 4,000 samples of clays from the United States and many foreign countries were investigated. New classifications and new methods of testing and rating were developed. Extensions of chemical and physical methods of clay analysis were developed to add to the knowledge of their structure and properties, and new occurrences of bleaching clays have been discovered.

A paper was prepared on observed temperatures in the crust of the earth for publication by the National Research Council. A program was outlined for calculation of certain mathematical tables by the Works Progress Administration, and a temperature survey was made of a 7,000-foot well near Washington, Pa. Tables were prepared for calculating the temperatures in a radioactive and a nonradioactive earth and also for calculating the temperature changes resulting from the flow of solar heat into and out of the earth for depths not exceeding 100 feet. The last two sets of tables are to be included in a final report on earth temperatures. A paper on geothermal methods of estimating the age of the earth is nearly completed.

The temperature machine which has been developed during the past few years is practically complete and has given highly satisfactory service. One of these machines is being used by the National Park Service in making a depth (and possibly also a temperature) survey of Crater Lake, Oreg.

A number of involved mathematical equations were solved by elaborate calculations.

Several field trips were made and papers were presented at regular meetings of the American Geophysical Union, the American Chemical Society, and various geological and mineralogical societies.

ALASKAN BRANCH

The work of the Geological Survey in Alaska is comparable in its aims with that performed in the various States, the principal differences being in the placing of the emphasis and in the methods used. Thus, because of the unsettled, undeveloped, and unknown character of much of Alaska, there is less immediate need for intensive detailed studies but more pressing calls for exploratory and reconnaissance surveys; less need for delimiting the precise boundary of a particular mineral area and more for determining the areas of economic importance. The training and experience required for carrying on such pioneer surveys are markedly different from those effective in intensive research on detailed problems, and the technique involved in the two types of investigation differs as greatly as does the art of the painter of miniatures from that of the painter of cycloramas. This condition in Alaska but repeats, in a measure, the history of the development of the Government's surveys in the States, where exploration preceded reconnaissance, and reconnaissance in time gave place to more detailed surveys. The stages of exploration and reconnaissance in Alaska are still far from being ended. More than half of the Territory has not yet been surveyed on standards that are regarded as adequate for reconnaissance purposes, and less than 1 percent has been surveyed on standards acceptable for detailed investigations. At the rate at which the work is now being carried on in Alaska many generations will have come and gone before even reconnaissance maps of the whole Territory are available. That the results of these investigations are urgently needed and widely used is shown by the large number of reports and maps sold and by the many requests for information, much of which cannot be supplied because the investigations or surveys have not yet been made. The reports and maps are widely used, especially by those concerned with the mining industry, and as they are the only authoritative sources of information for much of the country, they are indispensable to legislative and executive officers of the Government and others in the effective planning and successful conduct of many undertakings, such as airplane communication, roads, forestry, and national defense.

Field work.—As the field projects in Alaska do not lend themselves well to description by fiscal years, because the field work is usually started in May and continues as late in the fall as practicable, they will be described by field seasons. Thus, the projects undertaken in the field season of 1937 were financed in part from

funds appropriated for the fiscal year 1937 and in part from funds for the fiscal year 1938, and the projects for the field season of 1938 were financed by funds for the fiscal years 1938 and 1939.

For the field season of 1937 five field projects were carried on by the Alaskan Branch of the Geological Survey. Three of these were concerned principally with geologic investigations relating to the mineral resources of the Territory, and two were primarily topographic surveys. The areas in which the principal new geologic projects were undertaken were on Admiralty Island and adjacent tracts in southeastern Alaska; in the Alaska Range near the head of the Copper River; and in the vicinity of Goodnews Bay, near the mouth of the Kuskokwim River, in western Alaska. The surveys on Admiralty Island were designed to afford information regarding the possibility of the area containing deposits of nickel that might be of national importance, as well as to obtain additional facts regarding the occurrence and mineralization of the gold lodes that have long yielded a small but constant output of gold from the island. The part of the Alaska Range that was surveyed is among the least known areas, and the principal object of the work was to determine the general features of the geology and whether the geologic conditions are favorable for the occurrence there of deposits of lode and placer gold and other minerals similar to the deposits already known in the outskirts of the area. The work near Goodnews Bay focused on a study of the platinum deposits that now form the principal domestic source of platinum metals in the United States. The topographic projects included reconnaissance surveys in parts of the Alaska Range near the head of the Copper River and detailed and reconnaissance surveys in the platinum fields and adjacent areas of the Goodnews Bay district.

For the field season of 1938 six field projects had been started before the end of the fiscal year 1938, of which three are primarily geologic and three are primarily topographic. An additional field project for this season will be started as soon as practicable. All these projects will be continued in the field throughout the open season as late as conditions permit and will then be completed in the office.

The three geologic projects for the season of 1938 include work on Chicagof Island in southeastern Alaska, in the Copper River region, and in the upper Yukon region. The survey of part of Chicagof Island will embrace one of the large lode-gold areas in the western part of southeastern Alaska, and the study will be directed toward determining the conditions attendant on mineralization there in the hope not only of understanding the immediate conditions but of gathering information that may be of service in searching for similar deposits in areas where commercial deposits have not yet been found. The work in the Copper River region will be a continuation of the studies that have been in progress for 4 years to determine the facts regarding the extensive tract that lies in and adjacent to the Alaska Range. The investigations in the upper Yukon region will cover a part of the old fossil gravel deposits that extend for 100 miles to the northwest of Eagle and that appear to have been the source from which was derived much of the gold that was later reconcentrated by the present streams to form the workable placers now being extensively mined. The three topographic projects include surveys on Chicagof Island, in the Copper River region, and in the Tanana Valley. The first two are needed for immediate use by the geologists working in these areas, and the maps, when completed, will also be available for general use and will thus reduce somewhat the blank areas in the Territory. The survey on Chicagof Island is being made on a relatively detailed scale, but that in the Copper River region will be mainly of the reconnaissance type, except for a small area near the principal mine, which will be in more detail. The topographic work in the Tanana Valley will consist of photographing from

the air by means of special cartographic cameras the lowland of the Tanana River from Fairbanks eastward to the international boundary, an area of some 7,000 to 10,000 square miles of country, most of which has not been surveyed at all or at best only on crude exploratory standards. Unfortunately, lack of funds will probably prevent the Geological Survey from promptly taking off the information afforded by these pictures and working it up into maps, but this will be done as rapidly as funds and personnel become available. The preparation of maps of this area is of great importance in the consideration of almost all matters affecting transportation and development throughout this part of Alaska. Similar surveys and maps should be prepared of the other great natural routes through the interior, such as the entire lowlands of the Yukon River and its larger tributaries and of the Kuskokwim River and its tributaries.

Office work.—After completion of field work each season much office and laboratory work is required in analyzing the specimens collected, identifying by microscopic and other means the rocks and minerals found, perfecting the field sketches and drawings, and interpreting the various geologic phenomena observed, so that the significant facts are revealed and can be intelligibly expressed by maps and reports that are published and become available to the public. It is usually reckoned that these office studies and work require about twice as long as the original field work, so that if the original field work was done in 100 days it requires about 200 days to prepare the results for publication. If the results are not thus made available the public loses much of the value of the investigation for which it has paid.

An office project not directly related to new field work but requiring familiarity with the mining industry of Alaska is the annual canvass of the production of minerals from the Territory. This work involves analysis and tabulation of returns from mine operators throughout the Territory as to their year's output of any kind of minerals of value and the checking of these results by information from any other sources that will make it possible to give complete and correct records of the amount of each kind of mineral produced, the districts from which it came, and the new developments that have taken place or are in prospect. This work has been completed for the year 1937 and the results prepared for publication; the canvass for 1938 is under way.

Reports and maps.—During the year six reports containing maps, seven separate maps (including two new editions and three reprints), and five press statements have been published. Ten reports including maps, one separate map, and new editions or revisions of three maps are in course of publication. In addition three reports, one map, and new editions of two maps were partly completed. Five papers prepared by personnel of the Alaskan Branch were approved for outside publication.

TOPOGRAPHIC BRANCH

GENERAL OFFICE WORK

Necessary office work incidental to the field work of the Topographic Branch consisted in the inking, inspection, and editing of the completed topographic field sheets prior to their submission for reproduction and the computation and adjustment of the results of control field work and photo-planimetric compilation.

Control Section.—In addition to the routine adjustment of primary control, there has been in progress a general adjustment of both horizontal and vertical control to agree with the standard datums of the United States.

During the year the manuscripts for eight bulletins reporting the results of control surveys were prepared. Three bulletins for which the manuscript had been prepared previously were published. Spirit leveling in Kansas, 1896-1935 (Bulletin 889); in southeastern Missouri, 1896-1937 (Bulletin 898-A); and in Vermont, 1896-1935 (Bulletin 888).

Section of Photo-mapping.—In the section of photo-mapping, aerial photographs were used for the compilation of planimetric bases of sixteen $7\frac{1}{2}'$ quadrangles or parts of quadrangles in Louisiana and two $7\frac{1}{2}'$ quadrangles in Michigan, a total of 977 square miles. After the customary field inspection, these maps are published as planimetric maps. Line bases to assist in topographic mapping were likewise compiled of nine $7\frac{1}{2}'$ quadrangles in Massachusetts and fifteen $7\frac{1}{2}'$ and $15'$ quadrangles in Missouri, a total of 1,975 square miles, making a grand total of 2,952 square miles. Thirty-six square miles in Virginia and 49 square miles in Montana were mapped by the stereophotogrammetric method in the Washington office.

Cartographic Section.—Work on preparing additional sheets of the United States portion of the map of the world on the scale of 1:1,000,000 was resumed. Sheet J18, Chesapeake Bay, is in progress.

For the Bureau of Public Roads the work of preparing the transportation map of the United States was continued. Compilation and inking were in progress on 80 sheets. Proofreading and checking was done on 38 sheets. Maps of 5 States, comprising 38 sheets, were published.

Section of Inspection and Editing.—During the year 160 new maps were prepared for photolithographs as advance sheets. One hundred three new topographic maps were edited for publication, 6 of which were for three-color lithographs, and 97 for engraving. The preparation of quadrangle maps for reprinting is a large item in the work of the branch. Two hundred twelve quadrangle maps and 17 State and index maps were prepared and edited for reprint editions. Editing was also completed on 149 illustrations. Three hundred eighty-one proofs of maps in course of publication were read.

On June 30, 1938, in the Washington office, 126 topographic maps were prepared or partly prepared for lithography and 103 were in different stages of editing.

For the Conservation Branch the work of preparing river surveys for publication was continued. Work was done on 69 different projects. The maps of 28 projects, comprising 114 separate sheets, were transmitted for lithography during the year.

For the Tennessee Valley Authority the work of final preparation and transmitting of 12 maps for reproduction and the reading of 8 proofs was done.

During the year an exhibit of 40 maps was prepared for the International Geographic Congress to be held in Amsterdam, Netherlands, during July 1938.

MAP INFORMATION OFFICE

In January 1920 the Map Information Office, authorized by Executive order of December 30, 1919, was organized in the Geological Survey as part of the Topographic Branch. Since that time it has been conducted entirely by Geological Survey personnel.

The files of the office contain samples of practically all types of maps published by the Federal mapping agencies, many maps of foreign governments and commercial map publishers, catalogs and index maps, and a card index for reference, which is much used by Government agencies and the general public. In addition to its functions as a clearing house for map information, the office has also been given the task of collecting, classifying, and disseminating information concerning all aerial photography throughout the United States, both of a Federal and non-Federal character.

The office is used as a clearing house for all aerial topographic data similar to that for maps. One of the accomplishments of the year was the compilation and publishing, for the Board of Surveys and Maps, of an index map of the United States on which were shown all areas photographed up to March 1937.

Also, all of the minutes of the meetings of the Federal Board of Surveys and Maps have been taken, and all correspondence relating to the Board is done, by Geological Survey personnel.

FIELD SURVEYS

Work was done in 35 States and in Puerto Rico. Cooperative projects were conducted in 16 of these States and in Puerto Rico and with the Tennessee Valley Authority.

The art of making topographic maps from aerial photographs by the use of stereophotogrammetric methods is well established in the United States. By a cooperative agreement with the Tennessee Valley Authority, the Geological Survey is mapping areas within the Tennessee River Basin. On June 30, 18 Geological Survey employees were detailed on this project. Fifteen stereophotogrammetric plotting instruments are installed at Chattanooga, where the work is being done.

Of the area of the United States 45 percent has been covered by topographic maps, the year's increment amounting to 0.2 percent. The reduced percentage, as compared with 47.4 reported in 1937, is due to the fact that during the year maps of 79,668 square miles, based on reconnaissance surveys prior to 1896 and considered inadequate, have been withdrawn from distribution and the areas classified as unmapped.

WORK OF THE YEAR BY STATES

Abbreviations for projects listed below: Federal Emergency Administration of Public Works, "P. W."; Tennessee Valley Authority (by stereophotogrammetric methods) "T. V. A."

Arizona.—In preparation for geologic mapping, Klondyke 15' quadrangle completed and Galiuro Mountains 15' quadrangle begun. For the Forest Service, San Vincente 15' quadrangle completed. At the request of the National Park Service, Canyon de Chelly National Monument begun. Diamond Butte 15' quadrangle (P. W.) completed.

Arkansas.—In cooperation with the Geological Survey of Arkansas, Blakemore 15' quadrangle completed and Lonoke 15' quadrangle begun. Benton 15' quadrangle (P. W.) begun.

California.—In cooperation with the State engineer of California, Colton and Jurupa Mountains 7½' quadrangles completed. In preparation for geologic mapping, Grizzly Ridge 15' quadrangle completed. For the National Park Service, the revision of Sequoia and General Grant National Parks completed.

Colorado.—In cooperation with the Metal Mining Fund of Colorado, Duntun mining area and Ward Sunset mining area completed. In cooperation with the city of Denver, Arvada, Brighton, Fort Logan, and Long Branch 7½' quadrangles completed; Diamond K Ranch, East Lake, Fitzsimons, Golden, Littleton, Lafayette, Marshall, and Morrison 7½' quadrangles and the cultural revision for areas within the city limits of Denver begun. In preparation for geologic mapping, Climax 15' quadrangle begun and Gold Hill mining area completed. At the request of the National Park Service, Great Sand Dunes National Monument completed. Mount Gunnison 15' quadrangle continued for the Forest Service.

Connecticut.—Uncasville 7½' quadrangle (P. W.) completed.

Georgia.—For the Forest Service, Chatsworth (Ga.-Tenn.) 15' quadrangle completed and Tamasssee (S. C.-Ga.) 15' quadrangle begun. Coosa Bald, Cowrock, Jacks Gap, Mulky Gap, Neels Gap, Suches, and Tray Mountain 7½' quadrangles (T. V. A.) completed, and Noontootla and Wilscot 7½' quadrangles (T. V. A.) begun.

Idaho.—At the request of the Office of Indian Affairs, Pocatello, 15' quadrangle completed and Pauline 15' quadrangle begun. In preparation for geologic mapping, Big Creek and Yellow Pine 15' quadrangles and Wallace special area, sheets Nos. 2, 3, and 4 completed and sheet No. 1 begun. For the Forest Service, Headquarters 15' quadrangle begun. Landmark Rock 15' quadrangle (P. W.) begun.

Illinois.—Alto Pass, Casey, Lena, Monticello, and New Douglas 15' quadrangles completed; Ina and Mulberry Grove 15' quadrangles continued and Freeport 15' quadrangle begun in cooperation with the Department of Registration and Education of Illinois, Geological Survey.

Indiana.—In cooperation with the Department of Conservation of Indiana, Charlestown, Jeffersonville, New Albany, Owen, and Speed 7½' quadrangles completed and Bethlehem, Borden, Clear Lake, Coal City, Georgetown, Linton, and Switz City 7½' quadrangles begun.

Kansas.—In cooperation with the Geological Survey of Kansas, Altoona 15' quadrangle begun and Fredonia 15' quadrangle completed.

Louisiana.—In cooperation with the United States Army Engineer of the first New Orleans district, mapping with contours completed for Belle Chasse and Delacroix 7½' quadrangles and Hahnville, New Orleans, and Thibodaux 15' quadrangles. In cooperation with the Louisiana Board of State Engineers, mapping without contours from aerial photographs completed for Aloha, Bellwood, Bermuda, Clear Lake, Cloutierville, Coldwater, Coochie Brake, Creston, Cypress,

Flatwoods, Gorum, Grappes Bluff, Hagewood, Montgomery, Natchitoches, Powhatan, St. Maurice, and Verda 7½' quadrangles, and Hemphill Creek and Temple 7½' quadrangles begun.

Massachusetts.—In cooperation with the Department of Public Works, Division of Waterways, Assawompset Pond, Colrain, Leicester, Mount Grace, Orange, Paxton, Plympton, Sandwich, Shelburne Falls, Snipatuit Pond, Southwick, and Woronoco 7½' quadrangles completed; Hampden, Ludlow, Medfield, Sterling, and Wrentham 7½' quadrangles begun. Pawtucket (R. I.-Mass.) 7½' quadrangle (P. W.) begun.

Michigan.—In cooperation with the State Highway Department of Michigan, mapping with contours completed for Adair, Algonac, Goodells, Marine City, New Baltimore, Port Huron, St. Clair, St. Clair Flats, and Smiths Creek 7½' quadrangles; Rattle Run 7½' quadrangle begun; mapping without contours from aerial photographs completed for Dearborn, Detroit, Highland Park, and Royal Oak 7½' quadrangles. In cooperation with the Department of Conservation of Michigan, mapping without contours from aerial photographs begun for Ballentine 15' quadrangle.

Missouri.—In cooperation with the Geological Survey and Water Resources of Missouri, mapping with contours completed for Exeter, Fristoe, Knoblick, Middlebrook, Ozark, Silex, and Vienna 15' quadrangles and Butler, Fletcher, Galloway, Horton, New Home, Pacific, Tiff, Weldon Springs, and West Plains No. 1 7½' quadrangles; Cabool, Fordland, Gatewood, Long Lane, Noel, and Topaz 15' quadrangles continued; Linneus, Lupus, Rothville, and Vera 15' quadrangles and Eureka, Metz, Monegaw Springs, Moundville, Osceola, Rosecoe, and Worland 7½' quadrangles begun; mapping without contours from aerial photographs completed for Green Ridge, Nelson, Smithton, and Sweet Springs 15' quadrangles and Sedalia and Sedalia West 7½' quadrangles.

Montana.—For the National Park Service, revision of Glacier National Park begun. In preparation for geologic mapping, Little Rocky Mountains area begun. At the request of the Forest Service, Mount Cowen and Mount Wallace 15' quadrangles begun. Gallup City 15' quadrangle (P. W.) completed.

Nebraska.—In preparation for geologic mapping, Republican River, sheet No. 1, Hardy to Beaver Creek and sheet No. 4, Vining Creek to Alma completed and sheets Nos. 2, 3, and 5 begun.

Nevada.—In preparation for geologic mapping, Austin mining area and Mineral Hill 15' quadrangle completed and Cortez 15' quadrangle begun. For the Forest Service, Owyhee 15' quadrangle begun.

New Jersey.—Patterson 7½' quadrangle (P. W.) completed.

New Mexico.—For the Forest Service, Jemez Springs 15' quadrangle completed. In preparation for geologic mapping, Oil City 15' quadrangle completed and Hackberry Lake 15' quadrangle begun. Carrizozo 15' quadrangle (P. W.) completed.

New York.—In cooperation with the Department of Public Works of New York, Nyack 7½' quadrangle completed and East Syracuse and Haverstraw 7½' quadrangles begun.

North Carolina.—Andrews, Marble, and Peachtree 7½' quadrangles (T. V. A.) completed.

North Dakota.—Heart Butte 15' quadrangle (P. W.) completed and Aylmer 15' quadrangle (P. W.) begun.

Oregon.—At the request of the Forest Service, Mapleton 15' quadrangle completed and Earl 15' quadrangle resumed.

Pennsylvania.—In cooperation with the Department of Internal Affairs of Pennsylvania, Topographic and Geologic Survey, Allentown West, Millheim, and Waterville 15' quadrangles completed and Mifflinburg 15' quadrangle begun.

Puerto Rico.—In cooperation with the Commissioner of the Department of the Interior of Puerto Rico, Aguadilla, Isabela, Moca, and Quebradillas $7\frac{1}{2}'$ quadrangles completed; Alto Sano, Camuy, and San Sebastian $7\frac{1}{2}'$ quadrangles begun.

Rhode Island.—Pawtucket (R. I.-Mass.) $7\frac{1}{2}'$ quadrangle (P. W.) begun.

South Carolina.—For the Forest Service, Tamassee (S. C.-Ga.) $7\frac{1}{2}'$ quadrangle begun.

Tennessee.—For the Forest Service, Chatsworth (Ga.-Tenn.) $15'$ quadrangle completed. Bean Station, Caney Creek, Joppa, Luttrell, Mascot, Talbott, and Bristol and Holston Valley (Tenn.-Va.) $7\frac{1}{2}'$ quadrangles (T. V. A.) completed; Avondale, Benton, Clevenger, New Market, and Parkville $7\frac{1}{2}'$ quadrangles (T. V. A.) begun.

Texas.—Winona $15'$ quadrangle (P. W.) completed. In preparation for geologic mapping, Turkey Mountain $15'$ quadrangle begun.

Utah.—For the Forest Service, Delano Peak $15'$ quadrangle and Marysvale and vicinity completed and Beaver $15'$ quadrangle begun. In preparation for geologic mapping, Bull Valley area begun.

Vermont.—In cooperation with the State geologist of Vermont, Barnet $15'$ quadrangle continued.

Virginia.—Curles Neck and Richmond South $7\frac{1}{2}'$ quadrangles and Middletown and Winchester $15'$ quadrangles completed; Front Royal, Hightown, and Rustburg $15'$ quadrangles and Hopewell $7\frac{1}{2}'$ quadrangle begun in cooperation with the Conservation and Development Commission of Virginia, Geological Survey. Wallace, Wyndale, and Bristol and Holston Valley (Tenn.-Va.) $7\frac{1}{2}'$ quadrangles (T. V. A.) completed and Hilton and Mendota $7\frac{1}{2}'$ quadrangles (T. V. A.) begun.

Washington.—For the Forest Service, Dayton $30'$ quadrangle completed.

Wisconsin.—In cooperation with the State Highway Commission of Wisconsin, mapping with contours of Maiden Rock $15'$ quadrangle begun and mapping without contours from aerial photographs begun for Bessemer, Lac Du Flambeau, Minocqua, and Winchester $15'$ quadrangles.

Wyoming.—At the request of the Forest Service, Moccasin Lake $15'$ quadrangle completed and Mount Bonneville $15'$ quadrangle begun.

WATER-RESOURCES BRANCH

The importance of water and of systematic records related to the quantity, chemical quality, and availability of both surface and ground waters becomes increasingly greater each year. The growth of the country in population and industry, with consequent increases in demands for water, and especially the continued series of dry years that included the disastrous and widespread droughts of 1934 and 1936, and the many recent disastrous floods in different parts of the country, have impressed on the people the controlling importance of water in surface streams and in underground basins in relation to many of man's activities. The information collected by the Geological Survey is used extensively by many Federal, State, and private agencies. The Public Works Administration, the National Resources Committee, and related activities have found the Survey records and information with respect to water to be invaluable in studies of projects of all classes and in all sections of the country.

Reliable information with respect to supplies of water, both on the surface and in the ground, and to their fluctuations with variations in rainfall is essential to orderly, sound, and economic development along many lines, as in domestic water supplies, irrigation, flood protection, control of pollution, recreational uses, water-power development. The work of the water-resources branch thus occupies a position of great importance in the economic affairs of the Nation.

The investigations by the branch are conducted largely in cooperation with Federal bureaus; State, county, municipal, and other governmental agencies; and permittees and licensees of the Federal Power Commission. A major part of this cooperation is set forth below.

Federal bureaus.—Water resources investigations were conducted for the following Federal bureaus: The Bureau of Biological Survey, the Soil Conservation Service, and the Weather Bureau of the Department of Agriculture; the Office of Indian Affairs, the Bureau of Reclamation, and the National Park Service of the Department of the Interior; the Bureau of Prisons of the Department of Justice; the Department of State; the Federal Power Commission; the National Resources Committee; the Tennessee Valley Authority; the Office of Chief of Engineers, the Mississippi River Commission, and the Schofield Barracks of the War Department; and the Bureau of Naval Ordnance of the Navy Department.

States.—Amounts aggregating approximately \$806,000 were made available by States and municipalities for cooperative water-resources investigations. In addition to the data obtained as a result of this cooperation, other data having an estimated value of over \$133,000 were furnished by individuals and other organizations.

Permittees and licensees of the Federal Power Commission.—At the request of the Federal Power Commission, 30 engineers of the branch have been designated as representatives of the Commission to perform such field work as may be assigned to them by the Commission. The operation of about 295 gaging stations was conducted by the branch or was performed by permittees and licensees under the supervision of the branch in connection with 115 projects of the Federal Power Commission. Engineers of the branch have had field supervision of operation under permits and licenses of the Federal Power Commission in connection with 155 projects.

Division of Surface Water.—The division of surface water conducts investigations of surface water, which consist of the measurement of the flow of rivers in all the States, the District of Columbia, and Hawaii at selected gaging stations where the volume of water is measured and records of stage and other data are collected. In this work 46 States, the Territory of Hawaii, several Federal bureaus, and several individuals cooperated in the maintenance of the 3,831 gaging stations (of

which 2,616 are equipped with water-stage recorders) that were in operation at the end of the year. Records for about 113 additional gaging stations were received from Federal bureaus and from individuals. There were 46,832 regular and 5,024 miscellaneous discharge measurements made during the year.

Division of Ground Water.—The division of ground water investigates the waters that lie below the surface, in the zone of saturation, from which wells and springs are supplied; the source, occurrence, quantity, and head of these waters; their conservation; their availability and adequacy for domestic, industrial, irrigation, and public supplies and as watering places for livestock and desert travelers; and the methods of constructing wells and recovering water from them and of improving springs. The constantly increasing use of water supplies from wells is causing a greater demand each year for intensive studies of the quantities of ground water that are perennially available. Work was done in 34 States and in Guam, Hawaii, and the District of Columbia, nearly all in cooperation with Federal, State, Territorial, or local governmental agencies.

During the year about 100 technical reports or papers relating to ground water or reservoir sites were released to the public in printed, mimeographed, or typewritten form. Of special interest are the comprehensive report on more than 1,000 thermal springs in the United States (Water-Supply Paper 679-B), and the paper entitled "Some problems relating to legal control of use of ground waters," which was presented at the annual meeting of the American Water Works Association and published in the journal of that association. The report on water levels and artesian pressures in observation wells in different sections of the country in the calendar year 1937 is in press as Water-Supply Paper 840. A comprehensive paper on methods for determining the permeability of water-bearing material is in preparation.

Division of Quality of Water.—The division of quality of water analyzes water from surface and underground sources with reference to the suitability of the waters for industrial and agricultural uses and for domestic use (not related to questions of health) so far as such use is affected by the dissolved mineral matter. Analyses (partial or complete) of 2,474 samples of water from surface and underground sources were made in the laboratory in Washington, D. C., during the year. The analyses included some for many of the studies of ground water in the different States and for most of the special investigations on water supplies for specific projects. Close cooperation was continued with the division of ground water in the study of problems relating to quality of ground water and the preparation of the parts of ground-water reports that involve consideration of the chemical

character of the waters. During the year the sections in five ground-water reports concerning quality of water were reviewed.

Studies of suspended and dissolved matter of the Colorado River and its tributaries were continued. The unpublished analyses for the different gaging stations through September 30, 1937, were tabulated and the tables made available for public inspection in Washington, D. C., and in five of the Survey district offices in or near the Colorado River Basin.

Studies of silt movement on seven demonstration projects of the Soil Conservation Service of the Department of Agriculture, which were started as Federal Project 180 under an allocation of Public Works funds to the Survey, were continued. Summary reports of the results obtained from the beginning of the work through September 30, 1936, were prepared and transmitted to the Soil Conservation Service. The reports contain analyses of the records and recommendations for modifications of the work.

During the year water analyses were made for the Conservation Branch and the Geologic Branch of the Survey, for the Office of Indian Affairs and the National Park Service of the Department of the Interior, for the Department of Agriculture, for the Bureaus of Construction and Repair and of Yards and Docks of the Navy Department, for the Public Health Service of the Treasury Department, for the Architect of the Capitol, and for the government of the District of Columbia.

During the year five papers were presented by members of the division before educational, industrial, and scientific organizations.

Division of Power Resources.—The work of the division of power resources consisted of the compilation by States of information as to the capacity of water wheels in water-power plants of 100 horsepower or more as of January 1, 1938, on the basis of reports prepared by the Geological Survey's district engineers, thus providing a readily accessible file of information of developed water-power plants in the United States.

Assistance was furnished the Federal Power Commission in the preparation of a preliminary report on the use of power and its relation to water-power and fuel reserves requested by the President.

Copies of published reports and references to published articles and reports on water power and allied subjects were compiled and furnished to the chairman of the committee preparing a report on the Nation's energy resources, their prudent utilization and conservation, and their competitive relation to each other and to the economic structure, requested by the President.

A study is in progress and will be concluded in the fiscal year 1939 of the changes in the number, average capacity, average annual out-

put, and average use factor of privately and publicly owned electric public-utility power plants, based on records from 1920 to 1936.

Division of Water Utilization.—The division of water utilization investigates problems of the utilization and control of the waters of streams and under the administration of the Conservation Branch performs work relating to supervision and investigation of these problems and to activities pertaining to power projects of the Federal Power Commission and of the Department of the Interior as conducted by the field organization of this branch.

During the year the division has continued the investigations of water problems along the international boundary between the United States and Canada for the State Department and International Joint Commission. It has also continued the supervision and coordination of the collection by the district offices of the division of surface water of special stage and discharge information relative to recent outstanding floods. Water-supply papers, including these special flood data with reference to the floods of January–February 1937 in the Ohio and Mississippi Basins, the flood of May–June 1937 in New Mexico, and the floods of the winter of 1937–38 in California, have been submitted for printing or are in process of preparation.

The division is conducting studies of the relations of rainfall, runoff, and other hydrologic factors to develop fundamental information concerning the runoff characteristics of drainage areas and river systems. Such studies may be useful in appraising the practicability of flood control and water conservation by construction of reservoirs, by the proper use of land, and by other means, and in promoting better knowledge of the adequacy of available water supplies for various kinds of use.

The Water-Resources Branch is the authoritative collector of basic information regarding the stages and discharges of the rivers of the country. The interpretations by this division of data accumulated incidentally in the course of the peculiarly wide yet close study of the behavior of rivers and of such hydrologic phenomena as floods and droughts are a notable contribution to a body of scientific knowledge that will have wide practical applications.

WORK OF THE YEAR BY STATES

The stream-gaging stations listed under the different States are operated in part with funds appropriated to the Geological Survey, in part with funds furnished by States and municipalities in cooperation with the Geological Survey, and in part with funds furnished by other Federal bureaus.

Alabama.—Surface-water investigations were continued in cooperation with the State Geologist, and 43 gaging stations were operated. Funds were also contributed by the Mobile Army Engineer office and licensees of the Federal Power

Commission. Preliminary tests were made of 143 samples of well water from Coffee County in connection with a study of tuberculosis by the Public Health Service of the Treasury Department.

Alaska.—Analyses were made of two water samples from Mount McKinley National Park, and suggestions were made to the National Park Service in regard to treatment of the waters for hotel use.

Arizona.—Surface-water investigations were continued in cooperation with the State Water Commission, the State Water Conservation District, and the Salt River Valley Water Users' Association, and 50 gaging stations were operated. Funds were also contributed by the Federal Court Water Commissioner on the Gila River, the Bureau of Reclamation, and the Office of Indian Affairs. Reports on ground water in the Avra-Altar Valley and parts of the Gila and San Simon valleys were published as Water-Supply Papers 796-E and 796-F, and a report on ground water in the Holbrook region is in press as Water-Supply Paper 836-B. Analyses were made of 10-day composites of daily samples collected throughout the year from the Colorado River at Grand Canyon and at Willow Beach. The silt load was measured daily at gaging stations at both places. Samples from three springs near Tonto National Bridge, 5 miles south of Pine, were analyzed for the National Park Service.

Arkansas.—Surface-water investigations were continued in cooperation with the State Geologist and the State Highway Commission, and 32 gaging stations were operated. Funds were also contributed by the Little Rock Army Engineer office, the Weather Bureau, and licensees of the Federal Power Commission. Through cooperation with the State Agricultural Experiment Station the study of the annual pumpage and resultant fluctuations in ground-water levels was continued.

California.—Surface-water investigations were continued in cooperation with the State Department of Public Works, the Metropolitan Water District of Southern California, the East Bay Municipal Utility District, the Santa Clara Valley Conservation District, Stanford University, the cities of San Diego, San Luis Obispo, Santa Barbara, and Santa Cruz, and the counties of Los Angeles, Riverside, San Bernardino, Ventura, and Orange, and 284 gaging stations were operated. Funds were also contributed by the Bureau of Reclamation, and licensees of the Federal Power Commission. Water levels were measured in observation wells in different areas. The record for some wells now covers a period of 34 years. Tests were made for the Office of Indian Affairs of three samples from Agua Caliente Hot Springs near Palm Springs.

Colorado.—Surface-water investigations were continued in cooperation with the State Engineer, and 187 gaging stations were operated. A report on the artesian basin of the San Luis Valley was published as a part of the report on the Rio Grande Joint Investigation. Partial analyses were made of daily samples and composites of daily samples collected from the Colorado River at Grand Junction and from the Gunnison River at Grand Junction.

Connecticut.—Surface-water investigations were continued in cooperation with the State Water Commission, the cities of Hartford and New Britain, and 35 gaging stations were operated. In cooperation with the State Water Commission, and through the aid of a W. P. A. project, extensive records were obtained of water levels in observation wells and of the salt content of the water in wells near the coast. Field, laboratory, and office work were supervised for a W. P. A. project on the salinity of the Connecticut River, including the direction of the preparation of a report (nearly completed) based on about 150,000 determinations of chloride in samples collected since the initiation of the project in 1934.

Cuba.—Three samples of surface water from near Guantanamo were analyzed for the Bureau of Yards and Docks of the Navy Department with reference to the treatment of the water for a supply for the Naval Station.

District of Columbia.—Ground-water investigations were continued with special reference to pumpage and water levels. Analyses were made of a sample from a new well of the Department of Agriculture and of a sample from the Anacostia River at the intake entrance to the United States Capitol power pump house. Three samples for analyses were collected from wells at the District Training School at Laurel, Md., and recommendations made as to the treatment of the water.

Florida.—Surface-water investigations were continued in cooperation with the State Road Department, Okeechobee Flood Control District, and the cities of Jacksonville and Tampa, and 47 gaging stations were operated. Funds were also contributed by the Jacksonville Army Engineer office, and permittees of the Federal Power Commission. Ground-water investigations were continued in cooperation with the State Geological Survey. Progress was made on the report on the area west of the Suwannee River, and studies were begun in the Jacksonville area, where the rate of pumping for industrial purposes has recently been greatly increased.

Georgia.—Surface-water investigations were continued in cooperation with the State Department of Natural Resources, and 53 gaging stations were operated. Funds were also contributed by the Mobile Army Engineer office and permittees of the Federal Power Commission. A report on the warm springs of the State was published as Water-Supply Paper 819. Analyses were made of 10-day composites of daily samples collected at six gaging stations. Single samples from rivers at other gaging stations were analyzed, and samples were collected from 60 public water supplies, most of which were analyzed before the end of the year. Daily samples were collected at seven points on the Savannah River for the study of salinity.

Guam.—A report on the ground-water resources of the Island of Guam was transmitted to the Secretary of the Navy.

Hawaii.—Surface-water and ground-water investigations were continued in cooperation with the Territory of Hawaii, and a total of 118 gaging stations were operated on the islands of Kauai, Oahu, Molakai, Maui, and Hawaii. Several ground-water reports were released during the year. A study of the availability of geophysical methods in the ground-water work of the islands was undertaken in cooperation with the geophysical section of the geologic branch of the Survey. A report containing a detailed geologic map of Oahu is in press as Bulletin 2 of the Territorial Division of Hydrography, and a report giving the records of the wells on Oahu is in press as Bulletin 4. Reports on the ground water in Maui and Molakai are in preparation.

Idaho.—Surface-water investigations were continued in cooperation with the State Department of Reclamation and the State Water Conservation Board, and 293 gaging stations in Idaho and 2 in British Columbia were operated. Funds were also contributed by the Department of State. Comprehensive reports on the ground water in the Snake River Plain and in the Mud Lake region are in press as Water-Supply Papers 774 and 818. Water-level measurements were made in cooperation with the Soil Conservation Service.

Illinois.—Surface-water investigations were continued in cooperation with the State Department of Registration and Education, and 45 gaging stations were operated. Funds were also contributed by the Rock Island Army Engineer office.

Indiana.—Surface-water investigations were continued in cooperation with the State Department of Public Works and the city of Indianapolis, and 34 gaging stations were operated. Ground-water investigations were continued in cooperation with the State Division of Geology in the State-wide observation-well program, and special attention was given to the Indianapolis area.

Iowa.—Surface-water investigations were continued in cooperation with the State Geological Survey and the State Institute of Hydraulic Research, and 51 gaging stations were operated. Funds were also contributed by the Rock Island Army Engineer office. Investigations were continued in cooperation with the Soil Conservation Service in a study of the effects of soil conservation measures on the ground-water levels.

Kansas.—Surface-water investigations were continued in cooperation with the State Board of Agriculture, and 52 gaging stations were operated. Funds were also contributed by the Kansas City and Little Rock Army Engineer offices and the Soil Conservation Service. A State-wide study of ground-water resources was started in cooperation with the State Geological Survey. Most of the work was done in the area occupied by the *Equus* beds, with special reference to an improved water supply for Wichita. A preliminary report on the ground-water supplies available for irrigation in Ford County was published by the University of Kansas. The program of water-level measurements in the vicinity of Mankato was continued in cooperation with the Soil Conservation Service. During the year 666 samples for determination of the silt load were collected from four streams at points near Ionia and Jewell. The work on silt movement on the Soil Conservation Service project at Mankato was discontinued on June 30.

Kentucky.—Surface-water investigations were inaugurated on April 1 in cooperation with the State Department of Highways, and 32 gaging stations were being operated at the end of the year.

Louisiana.—Surface-water investigations were continued in cooperation with the State University, and 3 gaging stations were operated. Funds were also contributed by the Mississippi River Commission. Cooperation was started with the State Geological Survey in a systematic State-wide investigation of the ground-water resources, the first work being done in Rapides Parish.

Maine.—Surface-water investigations were continued in cooperation with the State Public Utilities Commission, and 33 gaging stations were operated.

Maryland.—Surface-water investigations were continued in cooperation with the State Geologist, the Washington Suburban Sanitary District, and the cities of Baltimore and Salisbury, and 26 gaging stations were operated. An intensive study was made for the Navy Department as to the quantity of ground water available in the vicinity of Indian Head.

Massachusetts.—Surface-water investigations were continued in cooperation with the State Department of Public Works, the State Metropolitan District Commission, the State Metropolitan District Water Supply Commission, and the State Department of Public Health, and 35 gaging stations in Massachusetts and 1 in Rhode Island were operated.

Michigan.—Surface-water investigations were continued in cooperation with the State Stream Control Commission, and 48 gaging stations were operated. Ground-water investigations were continued in cooperation with the State Geological Survey. All records obtained for observation wells since the beginning of the project in 1932 were prepared for publication.

Minnesota.—Surface-water investigations were continued in cooperation with the State Division of Drainage and Waters, and 212 gaging stations were operated. Funds were also contributed by the Department of State, the St. Paul Army Engineer office, and the Biological Survey.

Mississippi.—Surface-water investigations were continued in cooperation with the State Geological Survey, and 9 gaging stations were operated. Funds were also contributed by the Mississippi River Commission.

Missouri.—Surface-water investigations were continued in cooperation with the State Geological Survey, the State Highway Department, the State Park Department, and the cities of Joplin and Springfield, and 94 gaging stations were

operated. Funds were also contributed by the Kansas City and St. Louis Army Engineer offices and the Soil Conservation Service. The observation-well program in the Tarkio area was continued in cooperation with the Soil Conservation Service. During the year 3,590 samples from streams in and near the Tarkio and Bethany projects of the Soil Conservation Service were examined for silt content.

Montana.—Surface-water investigations were continued in cooperation with the State Engineer, and 147 gaging stations were operated. Funds were also contributed by the Department of State, the Kansas City Army Engineer office, and permittees of the Federal Power Commission. A report based on a 10-year record was released concerning the effects of the proposed storage in Flathead Lake on the ground-water levels at the head of the lake.

Nebraska.—Surface-water investigations were continued in cooperation with the State Engineer, and 59 gaging stations were operated. Ground-water investigations were continued in cooperation with the State Water Survey Department. The State-wide observation-well program was continued. The report on the geology and ground-water resources of south-central Nebraska, with special reference to the Platte River Valley between Chapman and Gothenburg, was published as Water-Supply Paper 779. Reports on the ground-water conditions in Keith County and in the Grand Island area were prepared, and work was started in Box Butte County.

Nevada.—Surface-water investigations were continued in cooperation with the State Engineer, and 11 gaging stations were operated.

New Hampshire.—Surface-water investigations were continued in cooperation with the State Water Resources Board, and 29 gaging stations were operated.

New Jersey.—Surface-water investigations were continued in cooperation with the State Water Policy Commission, the North Jersey District Water Supply Commission, and the Delaware River Joint Toll Bridge Commission, and 80 gaging stations were operated. Funds were also contributed by the New York Army Engineer office. Ground-water investigations were continued in cooperation with the State Water Policy Commission. The program of observation wells begun in 1923 was continued. A report on the water supplies from the No. 1 sand in the vicinity of Parlin was published by the State as Special Report No. 7.

New Mexico.—Surface-water investigations were continued in cooperation with the State Engineer, the Interstate Stream Commission, and the Middle Rio Grande Conservancy District, and 251 gaging stations were operated. Funds were also contributed by the Office of Indian Affairs. Ground-water investigations were continued in cooperation with the State Engineer and the Middle Rio Grande Conservancy District. Investigations were in progress in regard to the salt-water conditions in the Carlsbad area, the shallow ground waters in the Roswell Basin, and the ground-water conditions in the Middle Rio Grande area in relation to the surface water. A report on the ground-water conditions in the San Jose-Bluewater Valley was made for the Office of Indian Affairs. Reports on the origin of water in the Major Johnson Springs, near Carlsbad, and on the recharge of the shallow ground water in the Roswell Basin were released in typewritten form. Reports on geology and ground water were published as parts of the report on the Rio Grande Joint Investigation. Analyses were made of 186 samples from the Rio Grande and tributaries and of 426 samples from the Pecos River. In Roswell analyses were made of 10-day composites of daily samples from seven gaging stations.

New York.—Surface-water investigations were continued in cooperation with the State Department of Conservation, the State Water Power and Control Commission, the State Department of Public Works, the Black River Regulating District, the Hudson River Regulating District, the Oswegatchie River Improve-

ment Commission, the cities of Albany and Jamestown, the New York City Board of Water Supply, the Village of Ossining, and Nassau County, and 149 gaging stations were operated. Funds were also contributed by the Binghamton-Pittsburgh, and New York Army Engineer offices. Ground-water investigations were continued in cooperation with the State Water Power and Control Commission and with Nassau and Suffolk Counties. Records of wells in Kings, Suffolk, Nassau, and Queens Counties were published by the State as Bulletins GW-3, GW-4, GW-5, and GW-6. A report on the water supply of Shelter Island was released, and a study was made of the underflow of the Croton Valley below the dam. Papers on the methods used in the Croton investigation and on the return of ground water used in air conditioning and resultant temperature effects were presented for publication by the American Geophysical Union.

North Carolina.—Surface-water investigations were continued in cooperation with the State Department of Conservation and Development, and 96 gaging stations were operated. Funds were also contributed by the Tennessee Valley Authority, the Soil Conservation Service, and permittees of the Federal Power Commission. Ground-water investigations were continued in cooperation with Elizabeth City in a study of methods for overcoming the clogging of well screens. The collection of water-level measurements in wells has been continued. During the year 2,644 samples were collected for determination of silt in four streams near High Point, in connection with the operation of the Soil Conservation Service demonstration project.

North Dakota.—Surface-water investigations were continued in cooperation with the State Engineer, and 29 gaging stations were operated. Ground-water investigations were continued in cooperation with the State Geological Survey in a study of the Dakota artesian basin and the establishment of a State-wide observation-well program.

Ohio.—Surface-water investigations were continued in cooperation with the Miami Conservancy District, the Muskingum Watershed Conservancy District, and the city of Columbus, and 62 gaging stations were operated. Funds were also contributed by the Cincinnati, Huntington, and Pittsburgh Army Engineer offices. An investigation of ground-water supplies of Butler and Hamilton Counties, in the Cincinnati area, was continued in cooperation with those counties. A study was also made of pumpage from wells in the vicinity of Canton.

Oklahoma.—Surface-water investigations were continued in cooperation with the State Planning and Resources Board and Oklahoma City, and 27 gaging stations were operated. Funds were also contributed by the Soil Conservation Service, and the Little Rock Army Engineer office. Ground-water investigations in cooperation with the State Geological Survey were started, the first unit project being an investigation of Texas County with special reference to ground-water supplies available for irrigation. Water-level measurements were made in the Stillwater area of the Soil Conservation Service. During the year 228 samples were collected for determination of silt in three streams near Stillwater, Okla., in connection with the Soil Conservation Service demonstration project at Stillwater. The silt measurements were discontinued December 31, 1937. Partial analyses were made of 64 samples from wells near Ponca City in connection with a study of the pollution of ground water by waste from oil refinery operations. Analyses were made of six samples of ground and pond water used at zinc mines and mills.

Oregon.—Surface-water investigations were continued in cooperation with the State Engineer and the cities of McMinnville and Portland, and 200 gaging stations were operated. Funds were also contributed by the Portland Army Engineer office, the Biological Survey, and permittees of the Federal Power Commission. Ground-water investigations were continued on several projects in coopera-

tion with the State Agricultural Experiment Station and the State Water Resources Department. A report was released on water for domestic use in Columbia County. Reports were completed on the geologic features of the dam sites in the basins of the Nehalem, Rogue, and Willamette Rivers. Analyses were made for the National Park Service of two samples of water from Oregon caves.

Pennsylvania.—Surface-water investigations were continued in cooperation with the State Department of Forests and Waters and the city of Harrisburg, and 107 gaging stations were operated. Funds were also contributed by the Pittsburgh Army Engineer office, and permittees of the Federal Power Commission. Ground-water investigations were continued in cooperation with the State Topographic and Geologic Survey. The report on northeastern Pennsylvania was published by the State as Bulletin W-4, the report on south-central Pennsylvania is in press as Bulletin W-5, and the report on north-central Pennsylvania was completed and released in typewritten form. The collection of water-level data was continued.

South Carolina.—Surface-water investigations were continued in cooperation with the State Highway Department, the city of Spartanburg, and the town of Duncan, and 23 gaging stations were operated. Funds were also contributed by the Soil Conservation Service. The study of ground-water levels in the Tyger River area of the Soil Conservation Service was continued. During the year 8,532 samples were examined for silt content, and three gaging stations were maintained on North and South Tyger Rivers, in connection with the operation of the Soil Conservation Service demonstration project at Spartanburg. This work on the project was discontinued June 30.

South Dakota.—Surface-water investigations were continued in cooperation with the Kansas City Army Engineer office and the Biological Survey, and 21 gaging stations were operated. A report on the ground-water levels near Huron in 1937 was included in Water-Supply Paper 840.

Tennessee.—Surface-water investigations were continued in cooperation with the State Division of Geology, and 101 gaging stations were operated. Funds were also contributed by the Tennessee Valley Authority and the Nashville Army Engineer office. Records were obtained as to the pumpage and water levels in wells in Memphis. Preliminary tests were made of 216 samples of well waters from Giles County in connection with a study, by the Public Health Service of the Treasury Department, of tuberculosis in that county.

Texas.—Surface-water investigations were continued in cooperation with the State Board of Water Engineers, and 93 gaging stations were operated. Funds were also contributed by the Little Rock Army Engineer office. An extensive program of ground-water investigations was continued in cooperation with the State Board of Water Engineers and the cities of Big Spring, El Paso, Houston, and Lufkin. Intensive investigations were continued in the High Plains. A report on methods of locating salt-water leaks in water wells was published as Water-Supply Paper 796-A, and a report on ground water in Webb County was published as Water-Supply Paper 778. Mimeographed or typewritten reports were released on the ground-water resources of the Balmorhea, Lufkin, and Bryan areas and on the effects of pumping on water levels in the Houston area. Mimeographed reports were issued, giving the results of the W. P. A. water-well and spring inventories in the counties of Wilson, Ector, Dallam, Comal, Burleson, Brazoria (west of the Brazos River), Smith, Rusk, Lubbock, Leon, Karnes, Guadalupe, Lee, Knox, Glascock, Andrews (south half), Eastland, Lamb, Potter, Midland, Randall, Austin, Coleman, Shelby, Colorado, Hale, Swisher, Parmer, Panola, Refugio and part of Goliad, Brown, De Witt, and Floyd. A study was begun of the ground waters in the coastal sand-dune region. A substantial contribution in regard to the water levels in observation wells throughout Texas

was included in Water-Supply Paper 840. During the year 181 samples of water were analyzed.

Utah.—Surface and ground-water investigations were continued in cooperation with the State Engineer, and 71 gaging stations were operated. Special attention was given to the fluctuations of water levels with precipitation and pumpage or artesian flow and to the effects of the conservation program administered by the State Engineer. A report on the geology and ground-water resources of Ogden Valley was published as Water-Supply Paper 796-D. A report on the artesian water levels and interference between artesian wells in the vicinity of Lehi is ready to be published. Analyses were made of 36 composites of daily samples from the San Juan River near Bluff. The silt load was measured daily. Partial analyses were made of daily samples and of composites of daily samples collected throughout the year from the Colorado River at Cisco and the Green River at Green River.

Vermont.—Surface-water investigations were continued in cooperation with the State, and 27 gaging stations were operated.

Virginia.—Surface-water and ground-water investigations were continued in cooperation with the State Commission on Conservation and Development, and 89 gaging stations were operated. Funds were also contributed by the Huntington Army Engineer office. Work was done and a report released on artesian water in Southampton, Sussex, and Isle of Wight Counties. The observation-well program near Washington, D. C., which was begun in 1928, was continued.

Washington.—Surface-water investigations were continued in cooperation with the State Department of Conservation and Development, the Inter County River Improvement Commission, the cities of Aberdeen, Everett, Seattle, and Tacoma, and Skagit and Whatcom Counties, and 104 gaging stations in Washington and 5 in British Columbia were operated. Funds were also contributed by the Department of State, the Bureau of Reclamation, the Office of Indian Affairs, the Soil Conservation Service, and permittees of the Federal Power Commission. Ground-water investigations were begun in cooperation with the State Department of Conservation and Development and the city of Tacoma. A progress report on the Tacoma area was released and work was started in the Spokane Valley. Records were obtained on observation wells in the State-wide program and in the Pullman area of the Soil Conservation Service. During the year 4,946 samples were examined for silt content from six points on streams in and near the Pullman demonstration area.

West Virginia.—Surface-water investigations were continued in cooperation with the State Geological Survey, the State Public Service Commission, and the State Water Commission, and 46 gaging stations were operated. Funds were also contributed by the Huntington and Pittsburgh Army Engineer offices and permittees of the Federal Power Commission.

Wisconsin.—Surface-water investigations were continued in cooperation with the State Public Service Commission and the State Statutory Commission on Water Pollution, and 84 gaging stations were operated. Funds were also contributed by the Biological Survey, the Soil Conservation Service, the St. Paul Army Engineer office, and permittees of the Federal Power Commission. Records of water levels in observation wells were obtained in cooperation with the State Conservation Department and with the assistance of the Soil Conservation Service. During the year 2,434 samples from streams near LaCrosse were examined for silt content in connection with the operation of the LaCrosse demonstration project of the Soil Conservation Service.

Wyoming.—Surface-water investigations were continued in cooperation with the State Engineer, and 101 gaging stations were operated. Funds were also contributed by permittees of the Federal Power Commission.

CONSERVATION BRANCH

The work of the Conservation Branch involves surveys and investigations precedent to an inventory of the water and mineral resources of the public domain, supervision of private operations for development of power and production of minerals from public and Indian lands and naval petroleum reserves, and supplying information and advice to numerous land-administrative agencies of the Government.

These activities were maintained throughout the year, but not on the comprehensive and detailed basis that the work warranted, because of the lack of adequate funds. Mineral production during the year from public and Indian lands and naval petroleum reserves under supervision had an estimated value of \$88,500,000, and the revenue accrued therefrom amounted to about \$9,750,000. This substantial revenue is attributable both directly and indirectly to the supervision provided, the cost of which is meager compared with the income involved.

Cases pending in the branch at the end of the year decreased 16 percent, though the annual volume of work increased 72 percent, largely as the result of classification of the status of 7,697 oil and gas prospecting permits under the act of August 26, 1937, as required by Departmental Order No. 1240 of December 23, 1937. This work was accomplished by the assignment of a number of field engineers to Washington, with a consequent loss to field supervisory activities. Progress made on unit plans placed the work on a current basis at the end of the year. A total of 1,637 plans of development and operation were received during the year and at its close only eight of these were awaiting original technical consideration in the branch.

No expenditures were made from Public Works funds allotted for projects on which the several divisions of the branch had been engaged during the preceding year, and the unexpended balance of such funds was transferred back to the National Industrial Recovery fund on March 28, 1938.

MINERAL CLASSIFICATION DIVISION

The office activities of the mineral classification division were directed in considerable part to determining the areas subject to inclusion in plans for unit or cooperative development submitted by holders of Government oil and gas prospecting permits and leases and to consideration and submission of reports on initial applications for oil and gas leases.

In the aid of mineral classification pertinent information relating to the occurrence of carbon dioxide gas in Colorado; of coal in Montana, New Mexico, Oregon, Utah, and Wyoming; of oil and gas in Alabama, Colorado, Florida, Kansas, Louisiana, Mississippi, Montana, New Mexico, Oklahoma, South Dakota, Utah, and Wyoming; and of

phosphate in Florida, Idaho, and Wyoming was obtained either by the personnel of the mineral classification division or through the geologic branch.

In the routine work of the division 7,621 cases requiring technical consideration were disposed of during the fiscal year.

In addition to the preceding work, revision of the definition of the known geologic structure of one producing oil and gas field and the initial definition of another similar field were prepared and promulgated as follows:

Definitions of Known Geologic Structure, Fiscal Year 1938

State	Field	Date promulgated	Acres
Colorado.....	Moffat ¹	Dec. 17, 1937	4,357
Wyoming.....	Muskrat.....	Dec. 29, 1937	1,391

¹ Change in name.

The aggregate area of the outstanding definitions of the known geologic structure of oil and gas fields on June 30, 1938, amounted to 1,156,644 acres in California, Colorado, Montana, New Mexico, North Dakota, Oklahoma, Utah, and Wyoming.

WATER AND POWER DIVISION

The work of obtaining basic information as to the water-power resources and storage possibilities of public land and of making it available for use in the administration of public-land laws and by Federal and other agencies engaged in planning, constructing, and operating water-power projects was continued in the field, but on a small scale because of lack of funds. River utilization surveys covering 32 miles of streams and tributaries and detailed surveys at four dam sites were made. Surveys of mineral leaseholds embracing an area of 12.5 square miles were also completed. Work was continued in the office on the preparation of reports on geologic conditions at 61 dam sites examined in the field during the next preceding year.

Office activities included action resulting in the addition of 97,583 acres to outstanding water-power reserves in 9 public-land States and Alaska and the elimination of 5,890 acres from such reserves in 6 States, with a net increase of the total reserved area in 22 States and Alaska to 6,675,132 acres. The elimination of 1,995 acres from reservoir-site reserves left a net total of 131,499 acres withdrawn. Field supervision, with the Water Resources Branch, of power projects for the Federal Power Commission involved investigations and reports on 5 projects, supervision of construction and operation on 155 projects, and continuation of studies of cost accounting on 9 projects. Field supervision of power projects holding permits and grants from

the Department of the Interior involved 172 projects, making a total of 327 projects for the Department of the Interior and the Federal Power Commission.

Statistics compiled by the division show that the holders and users of rights-of-way granted by the Secretary of the Interior for power purposes had, for the calendar year 1937, an aggregate installed capacity of 5,278,764 horsepower, including 3,644,006 horsepower at hydraulic plants and 1,634,758 horsepower at fuel plants, and an aggregate energy generation of 14,040,649,490 kilowatt-hours, which is an increase of 22 percent over the production in the next preceding year. The energy generated by water power increased 2,124,816,095 kilowatt-hours, or about 21 percent, and that generated by fuel increased 447,452,772 kilowatt-hours, or about 32 percent. Revenues accruing to the Government from these grants aggregated \$249,025 from 1912 to 1937, and \$15,325 additional has been assessed for the calendar year 1938. Payments for unauthorized occupancy of public lands by power projects prior to the issuance of license therefor by the Federal Power Commission amount to \$104,667 additional.

MINING AND OIL- AND GAS-LEASING DIVISIONS

The work of the mining and oil- and gas-leasing divisions consists of inspectional and regulatory supervision of mineral prospecting and development on public land, Indian land, and naval petroleum reserves.

The mining division is charged with supervision of all operations for the discovery and development on public land of deposits of coal, potassium, sodium, phosphate, and oil shale; in New Mexico and Louisiana of sulphur; on certain land grants of gold, silver, and mercury; and on restricted allotted and tribal Indian lands of all minerals except oil and gas. This supervisory and regulatory work during the fiscal year was accomplished through six field offices at Denver, Colo.; Billings, Mont.; Carlsbad, N. Mex.; McAlester and Miami, Okla.; and Salt Lake City, Utah; and through a cooperative agreement approved May 4, 1935, with the Department of Mines, Territory of Alaska.

The work of the oil- and gas-leasing division includes inspectional and regulatory supervision of all operations for the discovery, development, and production of petroleum and natural gas on public land of the United States, on naval petroleum reserves, and on all Indian land subject to departmental jurisdiction, both tribal and allotted, except the Osage Reservation, Okla. The work was accomplished in the fiscal year 1938 through the agency of the 15 field offices and sub-offices at Taft, Calif.; Roswell and Farmington, N. Mex.; Tulsa, Oklahoma City, Holdenville, and Drumright, Okla.; Wichita Falls, Tex.; Denver, Colo.; Casper, Midwest, and Thermopolis, Wyo.;

Billings and Great Falls, Mont.; and Salt Lake City, Utah. During the year the territorial delineation of the three supervisory districts was changed and a fourth supervisory district created with headquarters at Roswell, N. Mex.

Public land.—The number of public-land properties under supervision of the mining division at the end of the fiscal year 1938 was 743, a decrease of 27 from June 30, 1937. Coal properties in 14 States and Alaska decreased 31, to 626; potash properties in 3 States decreased 5, to 34 in 2 States; sodium properties in 9 States increased 5, to 49 in 8 States; phosphate properties in 4 States decreased 4, to 7 in 3 States; sulphur properties in 1 State increased 9, to 27; and the 1 oil-shale lease was canceled. The reduction in coal properties resulted indirectly from the Secretary's instructions of January 24, 1934, and that in potash properties from the Secretary's order 914 of April 5, 1935. Senate Resolution 298, approved June 16, 1938, restricted further issuance of phosphate leases. In prospecting for the above-named minerals nine bore holes were drilled during the year.

Accidents to employees working in mines under departmental lease are generally fewer than in competitive mines not on Government land, and it is gratifying to note that of the 28 awards to coal mines by the Joseph A. Holmes Safety Association for the calendar year 1937, four were made to departmental lessees. The use of safety appliances and safety clothing is increasing generally throughout mines on Government land.

The number of public-land properties under supervision of the oil- and gas-leasing division decreased 4.9 percent to a total of 8,605, involving 11,749,396.98 acres in 18 States and Alaska.

A substantial part of the time of the personnel of the division was devoted to assisting oil and gas permittees in fulfilling departmental requirements for the submission of unit or cooperative plans of operation and development and to reviewing and revising the engineering and royalty features of such plans after their submission. Approximately 7,800 outstanding oil and gas prospecting permits were classified under the various extension provisions of the act of August 26, 1937 (50 Stat. 842). At the end of the fiscal year 1938 a total of 1,637 plans of unit or cooperative development for oil or gas pools, fields, or areas involving public land had been filed with the Geological Survey, of which 91 had been given final approval by the Secretary of the Interior, 1,492 had been rejected, withdrawn, or suspended, and 54 were pending final action, including 8 which were awaiting technical consideration in the Conservation Branch.

Drilling activity on public land during the fiscal year 1938 included the commencement of 362 new wells and the completion of 408 wells, of which 316 were rated as productive of oil and gas and 92 as barren.

The total number of wells under supervision on June 30, 1938, was 8,339, including 4,334 capable of oil or gas production. Production of petroleum from public land in 1938 was substantially greater than in other recent years; production of gas was approximately the same as in 1937; production of natural gasoline was substantially less than in other recent years.

Indian land.—The number of Indian-land properties under supervision of the mining division during the fiscal year was 235 in 9 States. These properties involved 44 lead and zinc leaseholds in the Quapaw Reservation, Okla., with aggregate royalty accruals of \$487,339.50, a decrease of 14.25 percent from the preceding year; 54 coal leaseholds on segregated Choctaw and Chickasaw land and restricted allotted land in Oklahoma, with an aggregate production, decreased from 527,579.75 tons in 1937 to 289,089.10 tons in 1938, and revenue accruals from royalties, bonuses, and sale of coal lands amounting to \$73,080.30; 1 asphalt lease on segregated land in Oklahoma; and 136 properties in 9 western States, of which 13 were agency coal mines, 12 coal lessees, 63 individual Indian coal mines, and 48 metalliferous leases and nonmetalliferous leases other than coal leases.

Oil and gas supervision involved 5,382 leaseholds, 4,407 wells, and aggregate bonus, royalty, and rental accruals estimated at \$2,500,000 for Indian beneficiaries in 11 States and 31 different tribes. The cooperative duties involved royalty accounting, appraisals of bonuses, royalty offers, and pollution damages, assistance to lessees of Indian land on operating problems and in the preparation of unit plans of development, and assistance to agency officials and tribal councils on technical phases of leasehold development and administration.

Naval petroleum reserves.—On behalf of the Navy Department supervision was continued during the fiscal year over operations for the production of oil and gas within Naval Petroleum Reserves Nos. 1 and 2, in California, and for the conservation of shut-in production within Naval Petroleum Reserve No. 3, in Wyoming. Production from 519 wells on the reserves aggregated 4,238,533.36 barrels of petroleum, 2,395,996,000 cubic feet of natural gas, and 10,581,504 gallons of natural gasoline and had an aggregate royalty value of \$1,020,444.84.

SUMMARY OF FIELD ACTIVITIES, BY STATES

Alabama.—Investigated oil and gas prospecting operations throughout the State in aid of mineral classification. Supervised one coal lease on public land.

Alaska.—Supervised 1 power project, 2 leases, 10 prospecting permits, and 4 licenses for coal, and 147 prospecting permits for oil and gas on public land..

Arizona.—Supervised 24 power projects, 3 prospecting permits for coal and 7 for sodium, 3 leases and 66 prospecting permits for oil and gas on public land, 7 Indian agency coal mines, and 11 asbestos leases and 1 gold lease on Indian land. Examined 3 vanadium lease applications on Indian land.

Arkansas.—Supervised 1 power project and 9 prospecting permits for oil and gas on public land.

California.—Supervised 92 power projects, 3 prospecting permits for coal and 27 for sodium, 1 sodium lease, 2 potash leases, and 240 leases and 1,037 prospecting permits for oil and gas on public land, 1 coal lease and 3 gold leases on Indian land, and 22 oil and gas leases on naval petroleum reserves.

Colorado.—Investigated occurrence of carbon dioxide gas in the Black Canyon area, Delta County. Supervised 16 power projects, 96 leases, 32 prospecting permits, 11 licenses, and 4 awarded lease applications for coal, 1 sodium lease, and 35 leases and 638 prospecting permits for oil and gas on public land, and 1 coal lease, 1 vermiculite lease, and 5 oil and gas leases on Indian land.

Florida.—Investigated phosphate and oil and gas prospecting operations throughout the State in aid of mineral classification. Examined one tract in Suwannee County, one tract in Glades County for purposes of mineral classification, and an area in Monroe County involving reported oil and gas occurrences.

Idaho.—In cooperation with the Geologic Branch initiated investigations of phosphate deposits in eastern Bonneville County. Supervised 40 power projects, 1 lease and 17 prospecting permits for coal, 2 phosphate leases, and 69 prospecting permits for oil and gas on public land.

Kansas.—Investigated oil and gas prospecting operations in western Kansas in aid of mineral classification. Supervised 5 leases and 18 prospecting permits for oil and gas on public land.

Louisiana.—Investigated oil and gas prospecting operations throughout the State in aid of mineral classification. Supervised 22 leases and 3 prospecting permits for oil and gas on public land.

Mississippi.—Investigated oil and gas prospecting operations throughout the State in aid of mineral classification. Supervised 1 power project and 1 lease for oil and gas on public land.

Montana.—For the Office of Indian Affairs examined a location in Flathead River, near Polson, Mont., for rock foundation for irrigation pump site. Examined two tracts of land in Cascade County for purposes of mineral classification. In cooperation with the Geologic Branch continued structural and stratigraphic investigations in the Little Rocky Mountains area, Phillips and Fergus Counties. Initiated an investigation of the coal resources of the Otter Creek district and Big Horn, Powder River, and Rosebud Counties. Made field investigation and prepared report on foundation for a pipe line. Supervised 39 power projects; 91 leases, 21 prospecting permits, and 42 licenses for coal; 7 phosphate leases; 127 leases and 827 prospecting permits for oil and gas on public land; and 2 Indian agency coal mines, 7 coal and 3 silver-lead-gold leases, 1 bentonite lease, and 50 oil and gas leases on Indian land.

Nevada.—Supervised 26 power projects, 5 coal prospecting permits, 1 phosphate lease, 6 sodium permits, 1 potash permit, and 68 prospecting permits for oil and gas on public land, and 11 marl leases on Indian land.

New Mexico.—Continued an areal, stratigraphic, and subsurface structural investigation in Lea and Eddy Counties for purposes of mineral classification. In cooperation with the Geologic Branch continued investigations of the coal resources and oil possibilities of the east side of the San Juan Basin, including the Lubarton and Monero districts, Rio Arriba County. Made additional studies of Dead Man's Wash erosion area. Supervised 3 power projects, 24 leases, and 20 prospecting permits for coal, 10 permits for sodium, 9 leases and 27 permits for potash, 27 sulphur permits, and 286 leases and 1,689 prospecting permits for oil and gas on public land, and 6 agency coal mines, 2 coal leases, 63 individual Indian coal mines, and 5 oil and gas leases on Indian land.

North Dakota.—Supervised 66 leases, 1 prospecting permit, and 21 licenses for coal, 4 permits for sodium, and 4 leases and 23 prospecting permits for oil and gas on public land.

Oklahoma.—Investigated oil and gas prospecting operations in western Oklahoma in aid of mineral classification. Supervised 3 power projects, 15 leases, and 87 prospecting permits for oil and gas on public land, and 30 leases, 23 mining permit leases, 1 leased purchased tract, 7 unleased purchased tracts, and 1 temporary mining permit for coal, 1 asphalt lease, and 1 right-of-way lease on segregated tribal and restricted allotted Indian lands, 44 zinc-lead leases on Quapaw Indian land, and 5,265 oil and gas leases on Indian land.

Oregon.—Examined 1 tract of land in Clatsop County for purposes of coal classification. Supervised 37 power projects, 1 lease and 2 prospecting permits for coal, 1 oil-shale lease, and 1 lease and 69 prospecting permits for oil and gas on public land.

South Dakota.—Completed a structural and stratigraphic investigation of the Gustave district in Butte and Harding Counties. Supervised 5 leases and 3 prospecting permits for coal and 46 prospecting permits for oil and gas on public land, and 6 oil and gas leases on Indian land.

Utah.—In cooperation with the Geologic Branch continued structural and stratigraphic investigations of the Henry Mountains area, in Wayne and Garfield Counties, and the Strawberry Valley quadrangle, in Utah and Wasatch Counties. Surveyed 6 square miles of mineral leaseholds. Supervised 16 power projects, 52 leases, 43 prospecting permits, and 3 licenses for coal, 4 sodium permits, 1 phosphate lease, and 39 leases and 887 prospecting permits for oil and gas on public land.

Washington.—Completed 32 miles of river-utilization surveys and surveyed in detail 4 dam sites on Tolt River. Supervised 21 power projects, 1 lease and 12 prospecting permits for coal, 1 sodium permit, and 8 prospecting permits for oil and gas on public land, and 5 silver-gold leases, 6 tungsten leases, and 1 oil and gas lease on Indian land.

Wisconsin.—Supervised 1 power project.

Wyoming.—Initiated topographic, structural, and stratigraphic investigations of the Lance Creek oil and gas field, in Niobrara County. Completed a structural and stratigraphic investigation of the Muskrat gas field, in Fremont County, and continued structural investigations of the Dewey and Mule Creek areas, in Weston County, for purposes of mineral classification. Examined two tracts of land in Lincoln County for purposes of coal classification. In cooperation with the Geologic Branch, continued investigations of phosphate deposits in northern Lincoln County. Completed structural and stratigraphic investigations of the Cody-Pitchfork district, in Park County, continued similar investigations of the east side of the Big Horn Basin, in Big Horn County, and initiated similar investigations of the Shoshone district, in Park County. Surveyed 6.5 square miles of mineral leaseholds. Supervised 6 power projects, 61 leases, 53 prospecting permits, and 22 licenses for coal, 2 permits for sodium, and 520 leases and 1,626 prospecting permits for oil and gas on public land, and 41 oil and gas leases on Indian land. Performed technical supervision at Emergency Conservation Camp 858, established for conserving coal deposits.

WORK ON PUBLICATIONS

Texts.—The book publications of the year numbered 56 in the regular series and 23 pamphlets and circulars for administrative use. The total number of pages was 8,910. Besides these printed publications 24 brief papers were issued in mimeographed form as memoranda

for the press or as informative circulars. During the year, 19,857 pages of manuscript were edited and prepared for printing, 2,537 galley proofs were read, and 9,714 page proofs were revised. Indexes were prepared for 47 publications, covering 7,386 pages. Copy and proof or stencils for 252 pages of multigraph or mimeograph matter were read. During the year, 75 foreign letters, in German, French, Spanish, Italian, and Portuguese, were translated.

Illustrations.—The section of illustrations prepared 1,657 drawings and photographs, transmitted 722 illustrations to accompany 32 reports, received and examined 1,009 proofs, and examined 60 edition prints.

Geologic map editing and drafting.—The geologic map of the Front Range, Colo., accompanied by a geologic legend, was prepared for engraving, and proof of the map and legend were read. The map is ready for transfer to printing plates. Color scheme for the map was prepared. A total of 182 illustrations, comprising geologic maps, sections, and diagrams, were drawn in the section to illustrate scientific papers of geologists. The drawings for 22 papers were edited, and proofs of 24 geologic maps and sections were read and corrected.

Distribution.—A total of 559 publications, comprising 56 new books and pamphlets, 106 new or revised topographic and other maps, 205 reprinted topographic and other maps, and 192 advance sheets were received during the year. A number of special pamphlets and forms for administrative use were also delivered and distributed. The total units of all publications received numbered 126,832 books and pamphlets and 943,340 topographic and other maps, a grand total of 1,070,172. The division distributed 112,010 books and pamphlets, 2,943 geologic folios, and 770,234 maps, a grand total of 885,187, of which 2,871 folios and 617,803 maps were sold. The net proceeds (gross collections less copying fees and amounts refunded) from the sales of publications were \$38,832.79, including \$38,307 for topographic and geologic maps, and \$525.79 for geologic folios. In addition to this \$9,877.92 was repaid by other establishments of the Federal Government at whose request maps or folios were furnished. The total receipts, therefore, were \$48,710.71.

Engraving and printing.—During the year 86 newly engraved topographic maps, including 3 revised maps, were printed, and also 24 special maps, making a total of 110 new maps printed and delivered. Of the newly engraved maps 59 were completed under the Public Works allotment. Corrections were engraved on the plates of 256 maps. Reprint editions of 190 engraved topographic maps and 12 photolithographed State and other maps were printed and delivered. In addition, 73 new topographic maps had been engraved and were in press June 30, including 53 under Public Works allotment, and the engraving of 111 other new topographic maps was in hand, including

54 under Public Works allotment. Of new and reprinted maps, 312 different editions, amounting to 822,475 copies, were delivered.

A large amount of work was done for 72 other units of the Government and State governments, and the charges for it amounted to about \$195,000, for which the appropriation for engraving and printing geologic and topographic maps was reimbursed.

Transfer impressions numbering 445 were made during the year, and the amount turned over to miscellaneous receipts was \$548.20.

Of topographic maps and contract and miscellaneous work of all kinds, a grand total of 4,331,170 copies were printed and delivered.

The photographic laboratory made 8,772 negatives (including 3,901 wet plates for photolithographs, 653 wet plates for photographic prints, 54 paper negatives, 1,426 dry plates, 521 lantern slides, 230 half-tone negatives, and 1,987 field negatives), 14,848 prints (including 1,302 maps and diagrams, 148 celluloid positives, 12,949 photographs for illustrations and records, and 449 bromide enlargements), 3,500 zinc plates, 309 intaglio etchings, and 10 celluloid prints, and mounted 2,052 prints.

LIBRARY

The total number of books and separate items circulated by the library amounted to 46,000. Books borrowed from other libraries for the use of the Geological Survey numbered 827, and books loaned to other libraries numbered 1,469. More than 21,000 new books, periodicals, maps, and other items were received, and more than 8,000 new cards were filed in the catalog.

About 1,400 books were bound at the Government Printing Office at a cost of more than \$7,000, which just about covered the binding of the new acquisitions of the year.

The bibliography of North American geology for 1935-36 was published as Bulletin 892.

APPROPRIATIONS AND EXPENDITURES

The appropriation made directly for the work of the Geological Survey for the fiscal year 1938 included 10 items, amounting to \$2,927,000, of which \$67,822.69 remained unobligated on June 30, 1938. In addition, \$6,500 was allotted from the appropriation for contingent expenses of the Department of the Interior for miscellaneous supplies.

Financial Statement of the Geological Survey for the Fiscal Year 1938

	Funds available				Total	Obligations		Balance
	Amounts appropriated or transferred	Repayments and adjustments		Disbursements		Outstanding liabilities	Total	
		Made	To be made					
Salaries.....	\$140,000.00	\$227.67	-----	\$140,227.67	\$140,224.69	-----	\$140,224.69	\$2.98
Topographic surveys.....	650,000.00	325,730.16	\$51,603.71	1,027,333.87	973,636.03	\$41,693.88	1,015,329.91	12,003.96
Geologic surveys.....	500,000.00	19,814.95	8,517.74	528,332.69	511,684.36	7,723.36	519,407.72	8,924.97
Alaskan mineral resources.....	60,000.00	159.44	-----	60,159.44	47,748.21	10,417.95	58,166.16	1,993.28
Gaging streams.....	900,000.00	387,501.82	150,783.91	1,438,285.73	1,382,412.31	1,382,412.31	1,410,602.65	27,683.08
Classification of lands.....	100,000.00	1,348.36	-----	101,882.70	98,237.79	955.84	99,194.63	2,688.07
Printing and binding.....	120,000.00	-----	534.34	120,000.00	18,335.64	114,000.00	6,000.00	6,000.00
Preparation of illustrations.....	22,000.00	-----	-----	22,000.00	21,979.42	1.50	21,980.92	19.08
Geologic and topographic maps.....	120,000.00	160,349.20	41,170.71	321,519.91	287,092.05	26,309.65	313,401.70	8,118.21
Mineral leasing.....	315,000.00	20,242.77	1,698.24	335,941.01	330,949.80	5,602.15	336,551.95	389.06
Total.....	\$2,927,000.00	915,374.37	254,308.65	4,096,683.02	3,812,300.30	216,500.03	4,028,800.33	67,822.69
Central Valley reclamation project, California (reimbursable) (transfer to Geological Survey), 1938.....	20,000.00	-----	-----	20,000.00	-----	754.99	754.99	19,245.01
Flood control, general (transfer to Interior, Geological Survey, Act Aug. 9, 1937).....	4,000.00	-----	-----	4,000.00	1,707.05	25.00	1,732.05	2,267.95
Flood control, Mississippi River and tributaries (transfer to Interior, Geological Survey, Act Aug. 9, 1937).....	4,000.00	-----	-----	4,000.00	2,847.13	1,046.38	3,893.51	106.49
Irrigation, Indian reservations (reimbursable), (transfer to Geological Survey, Act Aug. 9, 1937), 1938.....	15,750.00	-----	-----	15,750.00	9,447.19	5,948.42	15,395.61	354.39
Maintenance and improvement of existing river and harbor works (transfer to Interior, Geological Survey, Act June 22, 1936).....	b 8,106.98	3.73	-----	8,110.71	7,414.39	602.48	8,016.87	93.84
Maintenance and improvement of existing river and harbor works (transfer to Interior, Geological Survey, Act Aug. 9, 1937).....	62,670.00	36.23	-----	62,706.23	38,357.50	14,521.99	52,879.49	9,826.74
Maintenance, Wapato irrigation and drainage system, etc., Yakima Reservation, Wash. (receipt limitation) (transfer to Geological Survey, Act Aug. 9, 1937), 1938.....	500.00	-----	-----	500.00	147.35	352.64	500.00	-----
National Industrial Recovery, Interior, Indians (transfer to Geological Survey, Act June 22, 1933), 1933-39.....	b 357.82	-----	29.88	387.70	275.41	30.00	305.41	82.29
National Industrial Recovery, Interior, Geological Survey, 1933-39.....	c 93,524.89	1,504.90	18.58	95,048.37	79,442.05	4,494.72	83,936.77	11,111.60
National Industrial Recovery, National Resources Committee, Interior, Geological Survey, 1933-39.....	b 1,393.22	-----	-----	1,393.22	1,146.91	.91	1,147.82	245.40
Operation and conservation of naval petroleum reserves (Navy transfer to Interior, Geological Survey, Act Aug. 9, 1937), 1938.....	40,000.00	3.91	-----	40,003.91	39,934.53	3.40	39,937.93	65.98
Public Works Administration, allotment to Interior, Geological Survey, 1935-39.....	a 300,892.72	5,212.92	1,410.12	307,515.76	195,480.91	6,555.76	202,036.67	105,479.09

Supervising mining operations on leased Indian lands (transfer to Geological Survey, Act Aug. 9, 1937), 1938.....	80,000.00	230.68	176.34	80,407.02	80,219.81	179.80	80,399.61	7.41
Tennessee Valley Authority fund (transfer to Interior, Geological Survey, Act Aug. 9, 1937), 1938.....	119,889.49	913.08	31.66	120,834.83	101,647.12	12,483.66	114,130.78	6,704.05
Tennessee Valley Authority fund (transfer to Interior, Geological Survey, Act June 22, 1935).....	b 3,155.39	2,082.60	-----	5,237.99	5,233.24	-----	5,233.24	4.75
Waterways Treaty, United States and Great Britain (transfer to Interior, Geological Survey, Act June 16, 1937), 1938.....	48,500.00	-----	-----	48,500.00	33,529.83	13,170.08	46,699.91	1,800.09
Working fund, Department of the Interior (transfer from Army Engineers to Geological Survey, for topographic mapping, fiscal year 1935).....	b 10,702.40	-----	24.16	10,726.56	4,571.71	219.16	4,790.87	5,935.69
Working fund, Interior, Geological Survey (Agriculture, cooperative construction of rural post roads).....	* 38,456.72	778.58	1,066.63	40,301.93	21,168.04	-----	21,168.04	19,133.89
Working fund, Interior, Geological Survey (Agriculture, highway funds, Act of June 16, 1933, National Industrial Recovery).....	† 34,402.91	2,683.32	-----	37,086.23	13,692.13	-----	13,692.13	23,394.10
Working fund, Interior, Geological Survey (War, rivers and harbors).....	b 168.15	9.45	-----	177.60	177.60	-----	177.60	-----
Transfer total.....	886,470.69	13,460.00	2,757.37	902,688.06	636,439.91	60,389.39	696,829.30	205,858.76
Grand total.....	3,813,470.69	928,834.37	257,066.02	4,999,371.08	4,448,740.21	276,949.42	4,725,689.63	273,681.45

^a In addition to these appropriations there was an allotment of \$6,500 for miscellaneous supplies from the appropriation for contingent expenses of the Department of the Interior.

^b Balance unobligated on June 30, 1937, and continued available for expenditure during the fiscal year 1938.

^c Of the balance of \$161,524.89 remaining on June 30, 1937, \$88,000 has been rescinded.

^d Includes \$892.72 unobligated on June 30, 1937, and continued available for expenditure during the fiscal year 1938.

^e Includes \$18,436.72 unobligated on June 30, 1937, and continued available for expenditure during the fiscal year 1938.

^f Includes \$14,402.91 unobligated on June 30, 1937, and continued available for expenditure during the fiscal year 1938.

**Classification of Obligations Incurred by the Geological Survey During the Fiscal Year
Ended June 30, 1938**

	Salaries	Topographic surveys	Geologic surveys	Alaskan mineral resources	Gaging streams
Salaries of permanent employees.....	\$140, 224. 69	\$681, 451. 21	\$432, 904. 03	\$33, 928. 76	\$927, 348. 88
Wages of temporary employees.....		282, 414. 73	17, 071. 84	3, 133. 32	163, 524. 40
Supplies and materials.....		10, 296. 23	6, 688. 72	2, 495. 23	24, 790. 27
Dead storage of passenger-carrying vehicles.....		3. 10	5. 00		12. 00
Other storage and pasturage of animals.....		708. 23	173. 69		318. 52
Communication services.....		751. 11	401. 06	34. 45	5, 445. 72
Travel expenses.....		95, 812. 20	25, 350. 63	11, 652. 12	96, 912. 32
Hire, maintenance, repair, and operation of passenger-carrying vehicles.....		1, 375. 05	3, 534. 81	19. 87	37, 561. 14
Transportation of things.....		2, 737. 52	1, 575. 44	1, 439. 91	10, 631. 31
Hire, maintenance, repair, and operation of freight-carrying vehicles.....		38, 428. 98	5, 685. 12	74. 44	34, 216. 34
Printing and binding.....		89, 700. 35	7, 190. 52	2, 318. 72	5, 277. 96
Furnishing of heat, light, power, water, and electricity.....					183. 50
Rents.....		15. 00	202. 50	150. 00	2, 597. 99
Repairs and alterations.....		5, 868. 48	3, 559. 87	545. 26	38, 908. 30
Special and miscellaneous current expenses.....		7. 20	8. 84	29. 67	42. 08
Purchase of passenger-carrying vehicles.....		1, 303. 21	1, 677. 28		18, 066. 18
Purchase of freight-carrying vehicles.....		4, 979. 57	2, 841. 18		23, 111. 03
Purchase of scientific instruments and parts.....		3, 590. 88	2, 690. 18	55. 11	59, 005. 91
Other equipment.....		8, 667. 70	7, 850. 41	2, 289. 30	25, 190. 52
Structures and parts.....					24, 912. 93
Miscellaneous refunds, adjustments, and transfers.....		100, 006. 90			176, 215. 97
Total.....	140, 224. 69	1, 328, 147. 65	519, 411. 12	58, 166. 16	1, 674, 273. 27

	Classifica- tion of lands	Printing and bind- ing	Prepara- tion of illustra- tions	Geologic and topo- graphic maps	Mineral leasing	Total
Salaries of permanent employees.....	\$82, 219. 58		\$21, 558. 16	\$235, 975. 11	\$375, 733. 99	\$2, 931, 344. 41
Wages of temporary employees.....	4, 170. 82			233. 32	1, 681. 89	472, 230. 32
Supplies and materials.....	522. 47		56. 01	41, 060. 28	1, 140. 44	87, 049. 65
Dead storage of passenger-carrying vehicles.....					22. 02	42. 12
Other storage and pasturage of animals.....	57. 89				41. 61	1, 299. 94
Communication services.....	227. 20			2. 69	2, 382. 66	9, 274. 89
Travel expenses.....	6, 940. 57		3. 90	506. 70	17, 533. 03	254, 711. 47
Hire, maintenance, repair, and operation of passenger-carrying vehicles.....	1, 494. 69			39. 64	13, 729. 31	57, 754. 51
Transportation of things.....	217. 45			161. 89	2, 638. 78	19, 402. 30
Hire, maintenance, repair, and operation of freight-carrying vehicles.....	1, 398. 77				154. 18	79, 957. 83
Printing and binding.....	285. 60	\$114, 000. 00	331. 49		409. 53	219, 514. 17
Furnishing of heat, light, power, water, and electricity.....					4, 471. 11	4, 654. 61
Rents.....					507. 10	3, 472. 59
Repairs and alterations.....	143. 45		4. 19	10, 227. 84	3, 304. 15	62, 561. 54
Special and miscellaneous current expenses.....					68. 83	156. 62
Purchase of passenger-carrying vehicles.....	853. 00				4, 192. 50	26, 092. 17
Purchase of freight-carrying vehicles.....						30, 931. 78
Purchase of scientific instruments and parts.....	112. 22		22. 72	19. 50	25. 38	65, 521. 90
Other equipment.....	550. 92		4. 45	19, 310. 84	9, 321. 81	73, 185. 95
Structures and parts.....						24, 912. 93
Miscellaneous refunds, adjustments, and transfers.....				5, 863. 89	19, 531. 17	301, 617. 93
Total.....	99, 194. 63	114, 000. 00	21, 980. 92	313, 401. 70	456, 889. 49	4, 725, 689. 63

In addition to the above amounts, there was expended directly by cooperating agencies \$41,243.55 for topographic surveys, \$966.92 for geologic surveys, and \$480,481.61 for stream gaging.

APPENDIX

Summary of Outstanding Mineral Withdrawals and Classifications

[June 30, 1938, in acres]

State	Coal		Oil		Oil shale		Phosphate		Potash
	With-drawn	Classified as coal land	With-drawn	Classified as oil land	With-drawn	Classified as oil-shale land	With-drawn	Classified as phosphate land	With-drawn
Alaska.....		56,993							
Arizona.....	139,415								
Arkansas.....		61,160							
California.....	17,603	8,720	1,178,392						90,324
Colorado.....	4,142,233	3,082,272	215,370		1,172,778	952,239			
Florida.....							66,796	120	
Idaho.....	11,520	4,603					276,239	270,036	
Louisiana.....			466,990	4,233					
Montana.....	6,259,193	9,373,884	1,336,697	67,651			280,089	3,833	
Nevada.....	83,673								39,422
New Mexico.....	4,119,616	984,829							9,282,160
North Dakota.....	5,954,364	11,178,286	84,894						
Oregon.....	4,361	18,887							
South Dakota.....		250,093							
Utah.....	3,404,043	1,267,697	1,344,473		2,737,274	2,703,755	277,344	2,937	
Washington.....	691,801	141,444							
Wyoming.....	2,143,991	3,684,735	541,777		2,079,897	425,214	989,133	25,293	
Total.....	26,971,813	33,276,103	5,168,593	71,884	5,989,949	4,081,208	1,889,601	302,219	9,411,966

¹ Includes 3,151 acres of coal land reserved for use of the United States (coal reserve No. 1.)

² Includes 13,578 acres withdrawn as helium reserve.

³ Includes 2,078 acres of coal land reserved for use of the United States (coal reserve No. 2.)

General Summary of Cases Involving Land Classification

Class of cases	Record for fiscal year 1937-38						Record since receipt of first case	
	Pending prior to July 1, 1937	Received during fiscal year	Total	Acted on during fiscal year	Pending June 30, 1938	Gain or loss during fiscal year	Received	Acted on
Mineral leasing laws:								
Permit applications.....	17	162	179	169	10	+7	62,515	62,505
Lease applications.....	411	2,773	3,184	2,351	833	-422	7,091	6,258
Committee cases.....	12	64	76	76		+12	13,221	13,221
Concurrence.....	64	979	1,043	1,011	32	+32		
Interference (surface rights).....	10	210	220	217	3	+7		
Unit operation plans.....	161	284	445	391	54	+107	1,637	1,583
Cases involved in unit plans.....	966	1,350	2,316	1,907	409	+557	5,392	4,983
Development (drilling operations, etc.).....	2	53	55	51	4	-2	17,632	17,628
Miscellaneous.....		7,919	7,919	7,697	222	-222	7,919	7,697
Mineral classification:								
Oil and gas (including "349").....	264	1,014	1,278	1,218	60	+204	30,957	30,897
Water and power:								
Federal Power Commission:								
Preliminary permits.....	12	69	81	75	6	+6	515	509
Licenses.....							28	28
Determinations under Sec. 24.....	3	63	66	58	8	-5	691	683
Classification.....	3	5	8	7	1	+2	562	561
Rights-of-way.....	30	128	158	143	15	+15	7,454	7,439
Irrigation project reports.....		1	1		1	-1	945	944
General information:								
General Land Office (cooperatives, etc.).....	27	124	151	138	13	+14		
Indian Office.....							9,549	9,549
Total.....	1,982	15,198	17,180	15,509	1,671	+311		

¹ Classification of the status of oil and gas prospecting permits under the act of August 26, 1937 (50 Stat. 842), as required by Departmental Order No. 1240 of December 23, 1937.

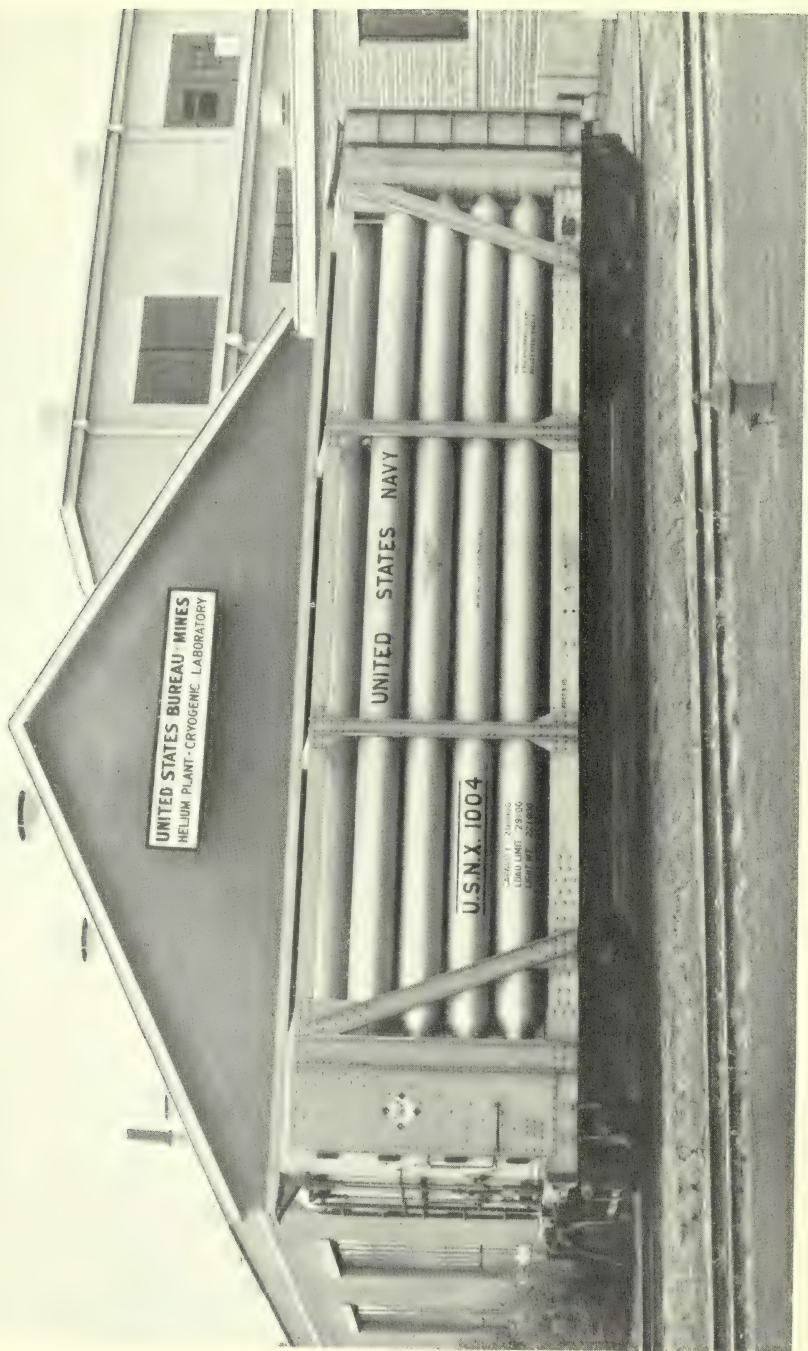
Mineral Production From Public Land and Revenues Accrued Therefrom, Fiscal Year 1938

State	Petroleum (barrels)	Natural gas (M cubic feet)	Gasoline (gallons)	Coal (short tons)	Potas- sium (short tons)	Sodium (short tons)	Phos- phate (short tons)	Accrued revenues
Alaska.....				124,272				\$7,233.73
Alabama.....				57,290				5,729.00
California.....	19,892,830	39,527,576	4,426,154	59		61,787		3,919,171.96
Colorado.....	1,006,257	1,413,857	49,427	491,228		1,325		132,542.42
Idaho.....				1,474				438.38
Louisiana.....	249,081	1,515,747	11,639					240,837.14
Montana.....	474,054	2,707,391		274,451			20,291	87,993.06
New Mexico.....	8,195,801	20,394,774	8,617,429	42,509	572,307	6,193		941,851.42
North Dakota.....		25,745		432,115				28,596.58
Oklahoma.....	146,095		197,699					21,110.01
South Dakota.....				3,178				530.29
Utah.....	180	2,266,048	453,431	1,080,352				134,226.62
Washington.....				20,690				2,069.53
Wyoming.....	11,666,070	12,081,292	25,754,114	1,267,023				1,706,161.98
Total.....	41,630,368	79,932,430	39,509,893	3,794,641	572,307	69,305	20,291	7,228,492.12
Total, 1937.....	37,556,776	80,186,340	97,838,813	4,221,203	449,584	75,870	26,104	6,338,007.08

Topographic Mapping by the Geological Survey in the United States, Puerto Rico, and Hawaii, to June 30, 1938

State	Total area mapped during fiscal year 1938 (square miles)										Types of standard surveys, with contours, fiscal year 1938 (square miles)	T total area mapped to June 30, 1938 (square miles)	Percent- age of total area of State mapped to June 30, 1938	Control, fiscal year 1938				
	For publication with contour intervals from 5 to 100 feet on scale of 1 to—													Re- sur- vey	Revi- sion	Spirit levels (miles)	Transit traverse (miles)	Triangu- lation stations occupied
	a Planimetric on scale of 1 to—	48,000	31,680	12,000	15,840	24,000	30,000	31,680	48,000	62,500									125,000
Alabama.....											761	—	—	—	—	—	—	
Arizona.....											286	—	—	—	—	—	—	
Arkansas.....											415	—	—	—	—	76	1	
California.....											120	305	—	—	—	155	21	
Colorado.....											239	—	—	—	—	628	18	
Connecticut.....				6		21					162	586	31	—	—	—	—	
Delaware.....											56	—	—	—	—	18	—	
District of Columbia.....												—	—	—	—	—	—	
Florida.....												—	—	—	—	—	—	
Georgia.....											b 297	—	—	—	—	—	—	
Idaho.....											13	—	—	—	—	—	—	
Illinois.....											329	129	—	—	—	34	—	
Indiana.....											532	31	8	—	—	199	—	
Iowa.....											353	—	—	—	—	829	8	
Kansas.....												383	—	—	—	633	—	
Kentucky.....												—	—	—	—	272	—	
Louisiana.....											383	—	—	—	—	231	—	
Maine.....												—	—	—	—	—	—	
Maryland.....											582	—	—	—	—	95	434	
Massachusetts.....											582	—	—	—	—	23	—	
Michigan.....												—	—	—	—	—	—	
Minnesota.....											513	—	—	—	—	596	1	
Mississippi.....											287	—	—	—	—	—	—	
Missouri.....												—	—	—	—	—	—	
Montana.....												—	—	—	—	—	—	
Nebraska.....											962	—	—	—	—	—	—	
Nevada.....												—	—	—	—	—	—	
New Hampshire.....											725	912	—	—	—	6	21	
New Jersey.....											249	—	—	—	—	40	—	
New Mexico.....											137	137	—	—	—	22	—	
New York.....											198	—	—	—	—	160	—	
North Carolina.....											250	—	—	—	—	180	—	
North Dakota.....												—	—	—	—	—	—	
											223	117	—	—	—	132	—	
												223	—	—	—	151	—	

See footnotes at end of table.



A SPECIALLY DESIGNED TANK CAR FOR THE TRANSPORTATION OF HELIUM FROM THE BUREAU OF MINES PLANT AT AMARILLO, TEX.

BUREAU OF MINES

John W. Finch, *Director*

DURING the fiscal year 1938 the Bureau of Mines has made definite progress in its dual program of safety in the mining industry and conservation of mineral resources.

The Bureau was founded in response to the popular demand that the Government do something to halt the appalling mine disasters that blackened the first decade of the twentieth century. One of the first jobs undertaken, therefore, was to win operators and miners alike over to a regime of safe mine operation. Improvement was painfully slow at first. Gradually it became evident that a man who was trained to render first aid to others usually took good care that others would not have to render first aid to him. In other words, graduates of the Bureau's courses in first aid and mine rescue were less likely than untrained men to take risks with themselves, with others, and with company property.

The number so trained since the Bureau's inception passed the million mark some time ago. On July 1 of this year it had reached the encouraging total of 1,146,854 persons; 1938 gave the records a substantial boost because, for the first time since 1931, over 100,000 persons were trained—105,093, to be exact. Now the coal industry is rapidly approaching the million mark on its own account; 835,581 members of that group have received their certificates.

The demand for Bureau safety instruction has spread rapidly in recent years. The men have found that a Bureau first-aid training certificate is regarded by employers as a virtual letter of recommendation, and accordingly workers in numerous occupations not strictly within the mining industry have made urgent requests for training.

Complementary to the Bureau's work of this kind has been the continuing investigation of safe working conditions, including not only safe equipment but pure, breathable air, uncontaminated by carbon monoxide and other noxious gases or by the equally insidious silica dust.

The Bureau of Mines believes, with its first Director, Joseph A. Holmes, that "True conservation is a wiser and more efficient utilization of our national resources." Accordingly, in the varied services it renders the mining industry in a variety of fields, the Bureau empha-

sizes the idea of use without unnecessary waste. Coupled with this is a correlative program of pointing out new uses for little-known materials and of helping our mining men and metallurgists to devise processes of treating American minerals so that they can be substituted gradually for uncertain supplies from abroad.

The strategic minerals—those vital to industry in peace and indispensable in war—have received special attention. The Bureau has devised and patented a process for producing 99.7-percent-pure manganese metal from low-grade domestic ores. It has conducted tests with a variety of American clays to prove that they can be used for wares as attractive and sturdy as expensive imported ceramics. And it has pointed the way to exploitation of the potash deposits of the Southwest that now furnish fertilizer salts equal to those of Germany and France.

The utilization of solid, liquid, and gaseous fuels has been of continuing interest to the Bureau for nearly three decades. Current standards for fuel are very exacting. Consumers demand a commodity that is clean and easy to use. Pictures of entrancing basement recreation rooms have banished many a coal bin. Nevertheless, the Nation's coal resources are much larger than the known resources of petroleum and natural gas, and since coal will doubtless be a standard fuel indefinitely the object now is to supply coal to householders in as clean and efficient a form as possible. The Bureau, especially at its stations in the Northwest and South, has tested the effectiveness of pretreatment on hundreds of samples of coal; it is now possible to obtain washed and dedusted bituminous coals that represent a decided advance in cleanness and efficiency over the dirty, crumbling fuel supplied a few years ago.

Knowing that the present-day economic structure depends upon petroleum and that the Nation's reserves of crude oil are not inexhaustible, the Bureau has pioneered in conducting tests on coal hydrogenation—a process already successfully applied in England, Germany, and Japan for obtaining oil from coal. By the time our oil fuels approach depletion, it is hoped that motor fuel can be supplied from coal so efficiently and cheaply that the transfer can be made from the old fuel to the new without drastic adjustments.

The cordiality of the relations between the petroleum industry and the Bureau's petroleum engineers is an outstanding example of friendly cooperation. The Bureau's exhaustive field studies—which unfortunately have been able to cover but a small part of the country's petroleum fields—frequently have been considered so valuable that the expense of publishing results has been defrayed by a State or trade organization.

Various State boards have asked the Bureau's petroleum engineers to assist them in cooperative studies of special problems. In Kansas,

for example, the Bureau has developed methods for disposing of oil-field brines, which were affecting livestock and crops and contaminating supplies of drinking water.

Natural-gas operators experience much trouble from freezing of pipe lines. Bureau engineers have invented an apparatus for determining the dew point of natural gas under pressure—that is, the temperature at which water will condense from the gas. Use of the device is helping to avoid interruption of service that may result from plugging of transmission lines with ice or compounds of water and hydrocarbons that solidify at temperatures above the freezing point of water.

For years the Bureau has been the Government's consultant on fuels. In addition to the samples of coal analyzed in connection with carbonization and classification studies, thousands of others from lots destined for Government office buildings, schools, and hospitals are examined at the tipple and at the point of delivery. Moreover, the Bureau gives advice to the Bureau of the Budget on the burning of fuels and the purchase and operation of equipment. This service saves the Government a considerable sum each year. In 1938 alone adoption of the Bureau's suggestions resulted in economies totaling about \$600,000, nearly 25 percent of the total funds allotted to the Bureau; thus it made a substantial contribution to its own support.

After issuing several hundred reports on individual mining and milling operations, the Bureau is assembling data under broad, general subjects, such as copper mining, or upon important mining districts. Bureau engineers are continuing to advise operators of small mines regarding safe and efficient methods.

Any disaster involving an explosion usually means a call upon the Bureau to determine the cause and to make suggestions for avoiding future catastrophes. No small part of the time of engineers in several Bureau divisions is taken by such emergency service.

A new policy was adopted in publishing the annual Minerals Yearbook. It had been noted that, although the copy did not go to press until the end of June, certain chapters, including final data for the preceding year, were completed several months before. By accelerating the publication schedule, it was found possible to pre-print 47 chapters out of the 70 comprising the volume before the complete manuscript went to press. Inasmuch as the Yearbook was not issued until the middle of August, it was possible to give a large sector of the mining industry information on production, foreign trade, and important developments at least 3 months earlier than if release of the complete volume had been awaited.

The scrap-metal demands of countries with extensive armament programs have stimulated the interest of American dealers in any information that affects their industry. In response to their urgent

request for service, the Bureau has augmented its annual scrap-metal survey, which formerly included nonferrous metals only, to include ferrous metals. The creation of a special section to handle data on the production and distribution of scrap metals represents the Bureau's reply to a specific demand by industry.

The Bureau's periodical reports on coal, petroleum, cement, and other commodities and the more general economic publications, such as the Mineral Trade Notes and the Foreign Minerals Quarterly, continue to be in demand.

In 1930, the total attendance at showings of Bureau of Mines films was 1,712,858; in 1933, it had risen to 2,996,000; by 1936, the total was 6,489,000. For the fiscal year 1938 the attendance was 10,351,700. The Bureau's motion-picture library of 4,095 reels and 2,182,530 feet of film is believed to be the largest of its kind in the world. Inasmuch as prominent industrialists have defrayed the cost of production and printing, this public service has been built up at no expense to the Government.

Long before President Roosevelt's inaugural address in 1933 the Bureau of Mines had adopted the policy of the good neighbor. As a direct outgrowth of a trip to this country in 1908 of a distinguished group of foreign government mining specialists an interchange of information on mining practice and equipment was built up. It now finds expression in the biennial mine safety conferences that have been held since 1931. The Fourth International Mine Safety Research Conference was held in Belgium in September 1937, with delegates from the United States, Great Britain, France, Poland, Czechoslovakia and Belgium. The cooperation between the Bureau of Mines and the Safety in Mines Research Board of Great Britain has been exceptionally cordial, and for many years an exchange fellowship was maintained, under the terms of which a member of the Bureau staff was detailed to research work in Great Britain and a member of the Board to research in this country.

The increased facilities made available to the Bureau by completion of the new Southern Experiment Station, Tuscaloosa, Ala. (dedicated in May 1936), the Eastern Experiment Station, College Park, Md. (dedicated in October 1937), and the new laboratory building at the Petroleum Experiment Station, Bartlesville, Okla. (also dedicated in October 1937) will enable it to serve the mining industries more efficiently. All were constructed with funds allotted by the Public Works Administration in response to requests from those who felt that the Bureau was qualified to render a definite service through improved facilities in the localities selected. The Eastern Experiment Station, for example, provides laboratories that are accessible to the entire eastern mineral industry. Additional space to be added at Boulder City, Nev., where the Bureau is conducting important

electrometallurgical experiments on American minerals, especially those obtainable within a reasonable distance from the station, should make possible further contributions to the already long list of achievements in the field the Bureau was created to serve.

FUTURE PROGRAM

The Bureau of Mines agenda for 1939 contemplate continuance of the numerous services rendered to the American mining industry, which have been increasing in number and complexity as the need for them has developed.

In the early days of the Bureau the principal emphasis seems to have been placed on safety instruction and the testing of fuels. Now the Bureau is being asked to show how the electrical energy generated as a byproduct of such huge Government projects as Boulder Dam, Grand Coulee, Bonneville, and the Tennessee Valley, may be converted into a servant of the mining industry, permitting utilization of domestic mineral resources that hitherto have defied man to put them to work. In another field, the Bureau is laying a sound groundwork for the day when depletion of our petroleum resources reaches the point where a motorized nation must begin to look elsewhere for some of its fuel. Moreover, the Bureau, as the Government's representative, is now responsible for the world's production of helium, the versatile gas that is being diverted to a number of uses.

The effect on buildings of blasting in mines and quarries is now being studied by the Bureau with much the same apparatus as is used to investigate earthquakes. Sounds so high that they are virtually beyond the range of the human ear and are therefore termed supersonic have been shown to offer a possible means of precipitating the harmful ingredients from the smoke of chimneys and from obnoxious smelter fumes.

These activities represent application of the sciences in their most modern phases, and are among the most interesting problems on the Bureau's current program. Nevertheless, the fact that they are a far cry from the relative simplicity of its first investigations does not swerve the Bureau from its original ideal of making mining the safest industry in the country and of utilizing America's varied and abundant mineral resources with a minimum of waste.

It is not too visionary to anticipate the day when every mine worker will be trained in first aid. In more than 1,900 mineral establishments 100 percent of the workers have been so trained, and the policy of preparing key men in the various plants to be instructors will relay first-aid knowledge among more men than the Bureau's half hundred safety engineers could possibly reach. If the force of safety men, who not only teach first aid and mine rescue but point out unsafe practices and dangerous machinery in mines, were increased, the cause of mine

safety could be advanced tremendously. Some mines competing in the annual Sentinels of Safety contest have completed a year and more without a single lost-time accident—proof that mining can be conducted without injury to workers.

A factor that contributes to waste of mineral resources is ungoverned production, resulting in accumulation of stock piles that frequently deteriorate before they are used, so that much of the original value is lost. If the Bureau's economists were afforded the opportunity to determine the Nation's requirements of the principal minerals, a way would be open for checking overproduction. At the same time, increments of strategic minerals could be set aside for an emergency without the economic dislocation that accompanied frenzied buying of supplies during the World War.

The Bureau would like to have personnel and facilities to show how many American minerals can be made to serve the Nation and banish the fallacious notion that certain foreign products are best. The next few years should witness substantial progress along these lines in localities where new equipment has been made available for the Bureau's use in demonstrating these facts. Unfortunately, however, in many instances these laboratories cannot give their maximum potential service because the personnel is inadequate.

The Bureau would also like to have at its disposal publications on the mining industry, in simple language, so that those who write for information can be supplied promptly, without the necessity of referring them to technical literature that is far above their needs. Even children in the fourth grade are assigned the study of coal mines as a project, and are encouraged to write to the Government for data. The Bureau is the logical source of such information. Many students learn about the Bureau of Mines through its films and write for publications that usually must be denied them because printing funds are inadequate to permit general distribution.

REVIEW OF THE YEAR'S WORK

During the fiscal year 1938, the work of the Bureau of Mines was administered under the Technologic, Economics and Statistics, Health and Safety, and Administrative Branches from headquarters in Washington, but most of the activities were conducted in mining districts well scattered over the country. Thirteen experiment stations (at Bartlesville, Okla.; Berkeley, Calif.; Boulder City, Nev.; College Park, Md.; Laramie, Wyo.; Minneapolis, Minn.; Pittsburgh, Pa.; Reno, Nev.; Rolla, Mo.; Salt Lake City, Utah; Seattle, Wash.; Tucson, Ariz.; and Tuscaloosa, Ala.) studied problems connected with mining, utilization, and conservation of the Nation's mineral resources, a number of field offices were assigned special duties, and the safety

instructors moved on a flexible schedule, visiting mining establishments on request.

TECHNOLOGIC BRANCH

The function of the Technologic Branch is to conduct engineering and scientific research in the interest of the mineral industries. The branch comprises six divisions—Coal, Mining, Metallurgical, Petroleum and Natural Gas, Nonmetals, and Explosives—and the office of the principal mineralogist. The branch also has charge of the cooperative program between the Bureau and the corresponding Government organizations in several foreign countries.

Coal Division

The Coal Division continued its experimental studies on mining, preparation, and use of coal. The results of an investigation of roof movement in mines afforded a basis for correlation of mining methods and roof behavior and indicated the advantages of removing the coal from a given area rapidly by mechanized mining. Other tests proved that the capacity of coal-cleaning plants was raised by using flocculating agents to remove fine coal and impurities from circulating water. Experiments on burning, carbonizing, and gas making, as well as analyses and measurements of physical properties, gave consumers additional information to guide them in selecting coal suitable for their purposes, thus obtaining greater satisfaction in its use. The experimental hydrogenation plant was developed to the point where assays of the hydrogenating properties of coals can be conducted rapidly.

Carbonization of coal.—Carbonization tests according to the Bureau of Mines-American Gas Association standardized procedure were made on four low-volatile and three high-volatile A-rank coals. The high-volatile coals contracted and the low-volatile coals expanded 16 to 40 percent. It was shown that expansion during coking is a straight-line function of the density of the charge and varies directly with the logarithm of the pressure due to the weight of the charge. The tests indicate that poorly fusing, low-volatile coals expand the most, because in the fused state the mass, being highly viscous, retains the decomposition gases and vapors and is expanded thereby. Washing reduced the ash of the low-volatile coals by only 0.8 percent, but even this reduction improved the coke to a measurable extent.

Analyses of coal for Government.—During the year, 8,681 samples of coal were analyzed in connection with Government purchases that were made on quality specified and verified by analysis, an increase of 11 percent over the past fiscal year.

Constitution and miscellaneous analyses of coal.—The constitution of the coals subjected to carbonizing tests was determined by petro-

graphic analysis. Samples of pure coal constituents—that is, anthraxylon, fusain, splint, spore, cannel, and attrital matter—were separated for hydrogenation studies. High- and low-temperature distillation assays were made on coals from various fields to estimate their coke- and byproduct-making qualities.

Hydrogenation of coal.—During the year quantitative procedures for the hydrogenation assay of American coals were developed, and assay work on one coal was completed. This work involved perfecting mechanical equipment for continuous operation of the plant, training operators for the three shifts necessary to accomplish continuous operation, and developing quantitative tests. The assay determines the optimum conditions in liquid-phase hydrogenation to obtain the maximum yield of a middle oil consistent with complete regeneration of the vehicle used in making a paste with the original coal.

Use of fuels.—An investigation of the effect of adding chemicals on the burning of coal was concluded, and the results were published in Bulletin 404, *Burning of Coal and Coke Treated With Small Quantities of Chemicals*. A small, overfeed stoker tested in combination with a modern hot-water boiler was found to give over-all efficiencies as high as 76 percent with intermittent operation, as in house heating.

Subbituminous coal and lignite.—Research on the utilization of subbituminous coal and lignite, particularly important as fuels in the West and Southwest, was initiated, and one publication on the carbonization of a subbituminous coal from Colorado was prepared.

Fuel-economy service.—To aid Federal agencies to purchase and utilize fuel more efficiently and economically, the fuel-economy service section made numerous power-plant and fuel-efficiency tests, as well as acceptance tests of new equipment; advised on the selection of proper fuel for many specific plants; and acted as consultant to various Government departments on such problems as purchases of fuel and of new equipment and preparation of specifications for various fuels, types of boilers, stokers, and auxiliary equipment. Power-plant expenditures of \$595,450 in this year alone, proposed to the Bureau of the Budget by various agencies, were found unnecessary.

Experimental coal mine.—Tests of a new and simplified design of rock-dust barrier showed that in many respects its behavior was similar to that of other barriers previously tested and recommended by the Bureau. However, simplification has resulted in poorer distribution of rock dust in advance of an explosion, an undesirable feature. Popular interest continues in large-scale demonstrations of coal-dust explosions and means of preventing them. Five such programs were witnessed by 1,500 visitors.

Conclusions and recommendations.—The requests of coal producers and consumers for information and advice based on work of the Coal Division are increasing in number and complexity faster than the facilities of this group have been expanded. Comprehensive surveys of the properties of American coals are urgently needed to enable producers to market their coal and users to obtain suitable coal. Gaseous and liquid fuels (because of their easy application) and lubricants are indispensable to industry; the present outlook is that some of these must eventually be made from coal, and the Coal Division should be prepared to help industry meet such a development. A coal-preparation laboratory to serve the northern Appalachian and eastern interior coal fields is particularly desirable.

Mining Division

The Mining Division continued to study metal-, nonmetal-, and coal-mining methods and costs, extended the mineral-industries survey into a number of areas not previously covered, tested and inspected electrical mining equipment for permissibility in gassy mines, gave technical aid to prospectors and small-scale operators, and conducted basic research on mining problems with regard to economy, safety, and conservation of mineral resources. Forty-six reports describing these investigations were issued during the year by the Bureau, 9 articles were published in the technical press, and 14 completed manuscripts awaited publication at the end of the year.

Metal mining and milling methods and costs.—Twenty-two information circulars in the comprehensive series on mining methods and costs at individual mines and mills were printed during the year. Of these, six described mining methods and costs, two milling methods and costs, and four both mining and milling methods and costs; four others treated general phases of mining, and six were reconnaissance papers on western mining areas or districts in which mining, milling, and general conditions affecting mining were discussed. Bulletin 405, *Copper Mining in North America*, was off press at the end of the fiscal year. Field engineers gave technical advice to prospectors and small operators who obviously could not afford to hire competent consultants.

Metal-mining research.—Original research at the Mount Weather (Va.) testing adit was devoted largely to investigations of (1) alloy-steel rock-drill bits, (2) hard-surface bits, (3) small-diameter full-reaming bits, and (4) dust from mining operations and (5) measurement of vibrations caused by blasting and their effect upon a frame building. The adit is now 540 feet long, and a 100-foot drift has been turned from it. The face is hard, dense basalt, ideal for test work.

Equipment was designed and tests made to measure stresses in rocks by geophysical methods, for the purpose of determining the strength and predicting the failure of rock pillars and arches in mines.

The Bureau of Mines has been credited with making the first actual measurements of vibrations induced in rock columns under variable loading. Results of the year's work by consultants were encouraging enough to warrant the assignment of a full-time physicist to this investigation. The research is designed to promote safety in mining and to determine in specific instances how much ore must be left for mine support.

Further study of dust produced by mining operations at Mount Weather resulted in some preliminary conclusions that were published by the Bureau's Safety Division.

Nonmetal mining.—Two engineers spent about half their time in the field visiting quarries. They studied quarry-operating methods, with especial reference to drilling, blasting, loading, and haulage practices, involving the making of detailed time studies. The results were tabulated and copies forwarded to the operator in each instance.

An information circular on the technical phases of mineral-wool production was issued, and manuscript for a bulletin—Sand and Gravel; Prospecting, Development, and Excavation—was completed.

Field tests of seismic vibrations set up by blasting in quarries were continued, and two progress reports interpreting the results were published. Three additional papers describing various phases of the vibration problem were prepared for technical journals. Blasting tests were made in the tunnel at Mount Weather, where explosive charges were increased until the resulting vibrations began to have destructive effects on a frame building. Tests for other Government departments were conducted upon request. Numerous improvements and changes were made in testing and calibrating equipment.

Coal mining.—Multiple-shift mechanical mining and rail and truck haulage in strip coal mines were among the problems given consideration. Three information circulars were published during the year—Shaft- and Slope-Bottom Lay-Outs at Coal Mines; Some Aspects of Strip Mining of Bituminous Coal in Central and South Central States; and Multiple-Shift Mechanical Mining in Some Bituminous Coal Mines, Progress Report I. Mines are the laboratories of this section, and the numerous aspects of mine operation are studied to reach conclusions that will help to increase efficiency and promote conservation and safety in coal mining.

Mine ventilation.—Information was gathered on the ventilation of mines and tunnels. A study of the causes, behavior, and control of fires in anthracite mines was continued, and a report based on records of past fires and more recent laboratory research was published as a résumé of the study to date.

The investigation of air-conditioning in mines was extended by means of field trips and analysis of a voluminous literature. Essential factors are being segregated and will be embodied in a forthcoming

paper that will discuss the results of present installations and attempt to define the limits of successful application.

Mineral industries survey.—Six circulars on separate districts or counties were published, and a study of the southern section of the Mother Lode of California (Calaveras, Tuolumne, and Mariposa Counties) is being made. A bulletin on Mining in Calaveras County has been completed and is now in press. Of especial interest are the conclusions of the authors regarding the potentialities for an expansion in drift-mining operations on placer deposits by employing modern equipment and mechanized mining methods. Field work was begun in Tuolumne and Mariposa Counties.

Electricity and machinery.—Inspection and tests for permissibility under Bureau of Mines schedules resulted in the formal approval of 64 pieces of equipment. Eight coal-cutting machines, 2 slate-cutting machines, 4 loading machines, 11 conveyors, 1 caterpillar truck, 1 room hoist, 1 mine pump, 1 rock-dust distributor, 1 hand lamp, 1 flashlight, 5 single-shot dry-cell blasting units, and 1 multiple-shot generator-type blasting unit passed the severe tests; and 17 motors, 4 starters, 2 junction boxes, 2 headlights, 1 headlight resistor box, and 1 control station were found suitable for use on permissible machines. Moreover, numerous changes in the design of explosion-proof compartments were reviewed and authorized. Following a study of fuels for use in flame safety lamps, specifications were drafted covering requirements for a satisfactory fuel. Mechanical and electrical hazards, other than the ignition of gas and dust, connected with the operation of machinery in mines, were studied, and data were assembled on (1) guards for the bits of cutting machines, (2) automatic couplers and brakes for mine cars, and (3) selection and care of mine hoisting rope. Four reports of investigations and three information circulars were published.

Conclusions.—Present types of investigation should be continued and, as in the past, they should be flexible enough to meet changing conditions and to consider subjects of timely and more pressing interest when they arise.

Metallurgical Division

The Metallurgical Division has made notable progress in its program of developing processes to the point where private industry is willing to undertake their commercial application. For example, a license has been issued to use the procedure developed by the division for electrolytic production of pure metallic manganese from low-grade ores; this method is expected to play an important role in the utilization and conservation of domestic manganese ores. The process devised for the chlorination of chromite and its subsequent gaseous reduction to pure metallic chromium has reached the stage where

industrial application is virtually assured. Other especially promising processes in various stages of development include the mechanical concentration of gases, the precipitation of fume by vibrational waves, the desulphurization of iron by special reagents, the use of positive-ion reagents in flotation, and the production of metallic magnesium. The preparation of high-manganese alloys having widely different properties provides a basis for the prediction that these alloys will fill a real need in diversified industries and may prove especially useful for naval purposes.

A more comprehensive summary of the work and a list of publications of the Metallurgical Division is contained in its annual report, published as a Bureau of Mines report of investigations.

Metallurgical fundamentals.—The work comprised experimental determinations of fundamental thermodynamic constants and the demonstration of their application to practical metallurgical problems.

Former studies included low-temperature specific-heat measurements upon manganese and its compounds with metalloids of the sixth periodic group, upon beryllium oxide (a difficultly reducible material), and upon sodium disilicate and silicate, with reference to the properties of slag systems. Dissociation-pressure and calorimetric measurements of the heat of setting of calcium sulphate hemihydrate have been completed; these are important technically with respect to the control of conditions accompanying the manufacture and use of gypsum plaster.

A practical demonstration of the production of pure sponge chromium, with controlled grain size, has been made on a laboratory scale, and the possibility of making a superior-quality product free from carbon, starting with low-grade domestic ores, has been successfully established. Mechanical methods of concentrating mixed gases containing constituents of different gas densities have been developed in detail, and with great success, through the laboratory stage, and studies necessary to their adaptation to technical use are nearly completed.

Metallurgy of steel.—The study of slag-metal reactions in the steel furnace has been promoted by developing equipment for making quantitative magnetic measurements and by working with synthetic slags.

The construction of a portable apparatus for determining coercive force has made experimentation possible in a steel plant; this resulted in establishment of a method for determining carbon in steel that is about three times as rapid as chemical methods.

Blast-furnace studies.—A new method of desulphurizing blast-furnace iron, steel, and scrap metal—involving treatment of the molten metal with calcium carbide and common salt—has been devised and may be of considerable value to the industry. Other studies on de-

sulphurization involved investigations of equilibria conditions in lime-silica-iron sulphide slags.

Special studies.—The results of the Division's mineral physics studies continue to be a basis for practical developments in widely divergent metallurgical fields. The coercimeter has evidenced its value for determining the efficiency of grinding and for shop control at steel plants. Work on the development of practical methods of obtaining high-frequency sound waves for settling dust and fume has proceeded at a rate commensurate with the limited provision for equipment and personnel.

Ore dressing.—Several problems of rather wide application have received special attention. A process for differential grinding was developed which offers improved possibilities for treating ores of oolitic or granular structure, such as iron ores and carnotites. A method has been devised for the flotation of a lead-zinc-fluorspar ore that permits separation of all of these constituents in marketable fractions. A pilot plant where this procedure will be tested is being built by private interests, and a mill for commercial operation will be erected later. A study of the application of both cationic and anionic wetting agents to flotation has reached an advanced stage.

Precious metals.—Investigations of the treatment of gold and silver ores have been continued. A mill of 100 tons daily capacity has been erected in Nevada to treat arsenical gold ores by a process developed in the Division's laboratories.

Nonferrous metallurgy.—Microscopic studies have shown the way for successful procedures in dressing various complex ores. Experiments on the effect of diluents on sintering lead concentrates are being continued as the limited facilities permit.

Ore testing.—In addition to ascertaining preferred methods for treating many types of ores from various districts, procedure for the volumetric determination of molybdenum has been developed and the results prepared for publication.

Copper metallurgy.—Studies of various methods for recovering sulphur from smelter smoke were continued. The absorption capacities and regenerative properties of amine solutions indicate that they may be used effectively for this purpose.

Electrometallurgy.—The principal features of the electrometallurgical work were the virtual completion of the laboratory at Boulder City, Nev., and the final development of a process for the production of manganese of 99.7-percent purity. This process has received United States Patent 2119560, of June 7, 1938, and has been assigned to the United States Government as represented by the Secretary of the Interior. The process is believed to be worthy of industrial application, and details have been prepared for publication. Briefly, an ore is crushed and ground, roasted, and leached; the metallic manganese

is electrodeposited from the purified electrolyte and the spent electrolyte is strengthened and used as the leaching solution. The power consumed is 3 to 4 kilowatt-hours, and the cost for large scale production is estimated at 6 to 7 cents per pound of metal.

A preliminary investigation has shown the feasibility of concentrating a Washington magnesite ore by flotation, and experiments are under way to develop a method for the economic production of pure metallic magnesium which, if successful, would go far toward establishing an industry in the Northwest capable of providing a lightweight metal for airplane construction and similar uses.

Other electrometallurgical work was concerned with the treatment of antimony metal and gold-antimony ores, the production of alumina from alunite, the treatment of copper-nickel ore, and the possible uses of certain minerals of the Boulder Dam region, particularly for ceramic ware.

Conclusions and recommendations.—The policy of the Metallurgical Division is to study various phases of metallurgy from their first stages as fundamental investigations, through their interpretation in terms of practical application and the development of treatment methods, to their trial in the laboratory, and if desirable their translation to pilot-plant operation. The results of these investigations supply information for the improvement of present metallurgical practice and act as an incentive for the establishment of new metallurgical industries.

Conferences with those in the industry have disclosed general satisfaction with the investigational program of the Division and with the results disseminated by its published reports. There has been an insistent demand, however, that certain problems be prosecuted at a rate that cannot be attained with present facilities. The most pressing of these problems include studies in nonferrous metallurgy, on the production of metallic magnesium, in developing practical means of producing dust-settling vibrations, in iron ore beneficiation, and on rare and precious metals.

The new buildings at Salt Lake City, Utah, and Boulder City, Nev., authorized by the Congress will provide room for expansion; the principal deterrent in the more active prosecution of these and other important problems on the Division program is lack of adequate funds to provide necessary equipment and additional personnel.

Petroleum and Natural-Gas Division

The Petroleum and Natural-Gas Division is a research organization that deals with technologic problems in the production and transportation of oil and natural gas and in the refining and storage of crude oil. It also operates the Government helium plant at Amarillo, Tex. The activities of the Division are diverse but have the common

objectives of increased conservation and better utilization of petroleum, natural gas, and related resources.

The laboratory and office building at the Petroleum Experiment Station, Bartlesville, Okla., erected with funds supplied by a Public Works allotment, was dedicated in October 1937, and much of the station's research equipment has been installed in the new space. The improved working quarters add greatly to the utility of the station.

Production of petroleum and natural gas.—Contributions to progress with regard to the production of petroleum and natural gas included a method for determining porosities of oil sands and data on porosities of various sands, which had been ascertained by that method; both were described in a published report. Other publications discussed problems relating to edgewater encroachment in oil sands and the flow characteristics and properties of fluids from a well of the so-called distillate type. Many such wells are being developed by drilling to depths that were not feasible a few years ago.

An extensive report on approximately 100 oil and gas fields in Wyoming and one on the porosity of the Sundance sand in the Lance Creek oil field in that State will be published in the near future. Studies are in progress on well spacing and on methods of drilling through troublesome formations, known as heaving shales. Results of research on oil-field emulsions soon will be published in a report giving the latest information on minimizing the formation of emulsions and methods of treating them.

Safety in the petroleum industry.—Records of 2,600 accidents in the Oklahoma petroleum industry during the calendar year 1937, obtained from the State Industrial Commission, were reviewed and analyzed as a basis for a report being prepared for publication.

Natural gas.—Substantial progress was made in solving problems of pipe-line transportation of natural gas; an apparatus developed by the Bureau of Mines for determining the dew point of gases under pressure will be a useful tool for operators, as knowledge of the temperature at which water will condense from a natural gas is important to the gas industry, especially in preventing interruptions of service due to freezing in long-distance transmission lines. The apparatus developed by Bureau engineers can be used to determine this temperature (the dew point) at the pressure in the pipe line or gas system. This device, which also is useful in other research activities, was developed in connection with a study of the nature of hydrocarbon hydrates and means of preventing formation of these troublesome compounds in pipe lines. A number of operators have had duplicates of the apparatus built for use in their operations from the report and drawings issued by the Bureau.

Bureau engineers who devised a new method for ascertaining the compressibility of gases are simplifying the apparatus, so that it may be used for determinations accurate enough for most engineering calculations without the precise manipulation required by the original design.

Engineering field studies.—Three separate but carefully coordinated studies deal with estimation of oil and gas reserves, relations between ultimate recovery and operating methods, and means of improving operating practices. These are: (1) An analysis of production histories of five fields of the Balcones fault-line system of Texas, which are largely depleted, have similar geological conditions, and were developed and operated without production control; (2) a study of the Anahuac field of the Texas Gulf coast—a high-pressure field with a sand reservoir, in the early part of its life, operated under controlled methods with modern engineering practice; and (3) studies of limestone-reservoir fields of southern New Mexico. Similar work has been started in the Rodessa field, Louisiana.

Oil-field brines.—Difficulties experienced by operators when injecting oil-field brines into salt-water-bearing strata, to avoid damage to lands and pollution of fresh water, led to requests that the Bureau make detailed studies of several plants, with a view of improving designs and practices. Clogging of the disposal formation was found to be caused by carbonates precipitated from solution and by corrosion products carried in suspension into the well bore. Chemical studies were made of the turbidity and stability, and physical tests of the corrosiveness, of brines from seven different brine-conditioning systems.

Chemistry and refining of petroleum.—Two additions to the series of gasoline-survey reports, prepared with assistance from the Cooperative Fuel Research Committee, were published during the year. Manuscripts also were published embodying analyses of crude oils from California, New York, Pennsylvania, Wyoming, and Montana, as well as Bulletin 401, Properties of Typical Crude Oils from Fields of the Eastern Hemisphere. A report on chemical and refining studies of Wyoming black oils will soon be available, and a manuscript on asphalts from Oregon Basin (Wyo.) crude oil is in preparation.

Helium production.—The Amarillo plant produced 6,100,000 cubic feet of helium in the fiscal year 1938—an increase of 1,300,000 cubic feet over the previous year—mainly for use by the Army and Navy in nonrigid airships. Helium was supplied to the United States Public Health Service for medical studies, the National Bureau of Standards for research, and the Weather Bureau for inflation of small meteorological balloons. The Weather Bureau has requested 450,000 cubic feet of helium for this purpose during the next fiscal year.

The amendatory Helium Act approved September 1, 1937, authorized the Bureau to sell helium for medical, scientific, and commercial use; regulations governing sales were approved by the President January 14 and amended with the President's approval March 10, 1938. Approximately 70,000 cubic feet of helium was delivered during the year for non-Government use, and helium-oxygen mixtures for treatment of respiratory diseases are now available in all sections of the United States. Helium now is sold at the Government plant at a fraction of its former cost for private use, and several contracts have been executed for deliveries of helium for the authorized purposes during the coming fiscal year.

Conclusions and recommendations.—The value of the Division's work is evidenced by the whole-hearted cooperation of the oil and gas industry and by unabated requests for more studies than can be undertaken with the funds and personnel available. The \$253,000 in Federal appropriations for the Division's oil and gas studies, supplemented by various facilities and about \$63,000 in cooperative funds supplied by States and other agencies, permits the Division to undertake only a fraction of the work that should be performed to promote conservation of petroleum and related resources. An obvious need is a larger staff in the field, with a small increase in the personnel at the Washington office to facilitate administration of the program.

An engineering building is needed at the Bartlesville station. Such a building was included in the original plans for construction at that station under the Public Works Administration allotment, but increased building costs required its elimination when the contract was let. Moreover, additional gas wells are needed on the Government's helium-bearing gas lands at Amarillo to prevent damage to existing wells through overdraft.

Nonmetals Division

The facilities of the Nonmetals Division have been increased encouragingly by new experiment station buildings at College Park, Md., and Tuscaloosa, Ala., built by funds made available by Public Works Administration allotments.

Froth flotation and utilization of new cationic reagents have made possible the following mineral separations: Diatomaceous earth from clay, spodumene from quartz feldspar and mica, vermiculite from associated gangue, feldspar from quartz, tremolite from talc, tremolite and serpentine from dolomite, gypsum from anhydrite and dolomite, clay from feldspar, mica from feldspar and quartz, and many others. A spectrographic method of quantitative analysis has been developed that is particularly applicable to rocks and rock minerals.

Plasticity of dispersions.—An important but little-known property of minerals is the plasticity of their dispersions. This subject has

been studied at the Eastern Experiment Station in a fundamental way from the standpoint of a relation between stress and deformation. Broad generalizations relating to the plasticity of mineral dispersions have been derived, and a more thorough understanding of the factors involved in the utilization of various types of minerals has resulted.

Southern barite.—Eleven barite ores from Alabama, Tennessee, North Carolina, and South Carolina were tested; three were of marketable grade and required no concentration, one was of such low grade that a salable barite concentrate could not be produced, and seven yielded high-grade concentrates.

Concentration of kyanite.—An extensive study of kyanite, an aluminum silicate occurring as an accessory mineral in gneiss and mica-schist, has been under way for 3 years, and during 1939 a report on all phases of kyanite mining and beneficiation will be submitted for publication. Froth flotation is the most reliable method of concentration, and the trade is demanding the fine sizes of kyanite to an increasing extent.

Beneficiation of clays.—Clays can be improved to some extent by flotation, although dispersion and sedimentation are the best methods of improving many of them. A study of ball clays has been initiated to make available materials suitable for ceramic dry mixes. Processing and beneficiation methods have been developed that will permit a certain Alabama kaolin to enter the paper-filler and coating trade.

Utilization of olivine.—According to Dana, olivine, a member of the chrysolite group, is an "orthosilicate of magnesium, with varying amounts of ferrous iron; a rather common rock-making material, varying from an accessory character to that of a main constituent of the rock." A new use for it—substitution for foundry sand in districts where silica sand is expensive—appeared feasible as a result of foundry casting tests with molds prepared from crushed olivine obtained at large deposits in the Pacific Northwest.

In the third year of study of olivine from northwestern Washington, at the Northwest Experiment Station, quarried and artificially shaped blocks were tested at high temperatures under load and in contact with basic slags, portland cement dust, and waste wood ash. The quarried block showed the best resistance to load and slag. The next best was a mixture of coarse olivine granules bonded with powdered olivine that contained 25 percent magnesium to raise its refractoriness, since the heat-resisting properties of the olivine decrease with the particle size. These synthetic mixtures showed good resistance to load at high temperatures and to the action of portland cement, but poor resistance to waste wood ash and thermal shock. Molding under pressures of several tons per square inch produced a better structure and resistance.

Utilization of coal refuse.—Coal refuse and bone coal are mine wastes too high in ash for fuel. Studies are in progress to devise some means of heat and chemical treatment that will adapt this material for use in water-supply treatment to remove obnoxious tastes and odors.

Boiler-water studies.—The investigation of various waters that cause embrittlement of boiler steel has been very fruitful. A number of substances in the water besides silica have been found capable of causing steel cracking, lead being the most potent. The study of protection against this undesirable action likewise has been most successful. Certain organic materials, including some classes of tannins and the sulphite paper-mill lignin, have shown excellent protective qualities. During the coming year these discoveries will be applied to boilers in commercial operation. A comprehensive summary bulletin on the subject is in preparation.

Conclusions and recommendations.—The demands for improved quality in products made from nonmetallic minerals and the desire to substitute domestic for imported raw materials because of the uncertainty of foreign supplies necessitate research in the preparation and utilization of this widely occurring group of minerals. Results can be achieved most economically by the Nonmetals Division, whose experience is wider in scope than any single industry can attain. This work should be prosecuted with vigor to accelerate development of new industries in the Southeastern States and in the Pacific Northwest.

Explosives Division

The Explosives Division continued its research and test work on the explosibility of gases and vapors and upon the properties of explosives, particularly those studies relating to the suitability and permissibility of explosives for use in mining.

Gas explosions.—The study of gas explosions included further development of calculation of the explosibility of complex gaseous atmospheres containing propylene, air, nitrogen, and carbon dioxide; and derivation of data on the amounts of inert gas required to render various combustibles nonexplosive and on oxygen concentrations below which combustibles are incapable of propagating flames.

Experiments on explosion hazards in underground manholes were continued, and fires and explosions in manufacturing plants were investigated. Questions relating to the combustibility and explosibility of material sent through the mails were answered.

Mine fires.—In the study of mine fires, inflammabilities of the gaseous distillation products from heated anthracite were ascertained, and the disappearance of carbon monoxide from sealed mine areas was shown to be due, in part, at least, to the action of micro-organisms.

Poisonous gases from explosives.—Experiments upon the emission of toxic gases from certain explosives were continued. Deteriorated

explosives were shown to give increased quantities of oxides of nitrogen.

Liquid-oxygen explosives.—A cooperative study developed methods for reducing the inflammability of liquid-oxygen explosives without loss of explosive qualities.

Mechanism of ignition of explosive gas mixtures by explosives.—The conditions governing ignition of gases by explosives are being studied. The action of incandescent particles has been given major attention.

Explosive and toxic hazards from Diesel engines underground.—The Explosives Division, in cooperation with the Health Division, has begun a study of the exhaust gases from American Diesel engines.

Testing explosives.—Sixteen explosives were tested for permissibility in coal mines; 13 of these passed all the required tests. A total of 576 gallery tests and 1,657 other control tests was made at Bruceton, Pa. The Explosives Chemical Laboratory at Pittsburgh made 177 chemical analyses.

Conclusion and recommendations.—The continued occurrence of fatal and costly accidental explosions in industry and in homes, owing to misuse of explosives and ignorance of the potential dangers from explosive mixtures of combustible gases and vapors with air, attests the necessity for increasing vigilance by the Explosives Division in advising and warning manufacturers and other users regarding these hazards.

Principal Mineralogist

Review of work.—Prospectors and others who find mineral specimens that they cannot identify turn to the Bureau of Mines for help. The micas, with their shining cleavage faces—especially weathered biotite, which displays an almost metallic brassy or bronzy luster—are the minerals most often submitted for identification. Pyrite, whose deceptive yellowish metallic luster causes the uninitiated to mistake it for gold, ranks second in number of samples received. Although many of these specimens have little or no value, some unusual and economically important minerals have been identified. These include dakeite (a recently described uranium-radium mineral from a new locality, near Winnemucca, Nev.), columbite, beryl, and others. The principal mineralogist examined and identified more than 2,000 specimens and answered over 1,000 inquiries concerning mineral deposits.

In addition, he consulted with industrial engineers and members of the Bureau staff on problems related to the utilization of minerals. During the year he also inspected deposits of spodumene in Massachusetts and of spodumene and other minerals in North Carolina; he is endeavoring to create interest in the use of spodumene and of spodumene-bearing pegmatite in the ceramic industry, for which these minerals seem to be especially adapted.

ECONOMICS AND STATISTICS BRANCH

The Economics and Statistics Branch collected and published data on the production and consumption of all principal mineral commodities and prepared reports giving the results of special economic studies; it also prepared the annual publication entitled "Minerals Yearbook," which appears both as a complete bound volume and as separate chapters. The branch comprised the Coal Economics, Petroleum Economics, Mineral Production and Economics, Metal Economics, Nonmetal Economics, and Foreign Minerals Divisions.

Coal Economics Division

The Coal Economics Division maintained uninterrupted its current and annual statistical publications on the solid mineral fuels (with the exception of bituminous coal), notwithstanding the transfer on July 1, 1937, of two-thirds of its personnel and operating funds to the National Bituminous Coal Commission.

Service to the solid mineral-fuel industries.—This service comprised:

(1) The collection of data on the production, distribution, and use of anthracite, semianthracite, lignite, coke, fuel briquets, packaged fuel, and peat; preparation of the corresponding statistics; and their weekly, monthly, and annual publication in appropriate form.

(2) Answering of inquiries by mail, telephone, and personal call.

(3) Completion and publication of Distribution of Byproduct and Beehive Coke in 1936, a 26-page mimeographed report.

Economic studies.—No special economic studies could be made during the year, as all of the personnel was fully occupied in maintaining the statistical routine and all trained economists had been transferred to the Coal Commission. The situation in this respect should be slightly better during the current fiscal year, as the personnel has now become familiar with its reallocated duties and should have a slight margin of time available for special studies. In spite of this, without restoration of some of the funds transferred to the Commission when the work on bituminous coal was split off from the Coal Economics Division, any important economics study will have to be done largely on overtime.

Economics in operation.—Several years ago the Coal Economics Division, lacking adequate funds of its own, adopted the policy of accepting statistical data collected by certain trade agencies. This procedure was continued through the past fiscal year, the Market Statistics Unit (later organized as the Bureau of Research and Statistics) of the National Bituminous Coal Commission being added as an acceptable agency for certain distribution and stock data on anthracite and coke. These data continue to be collected by clerks transferred from the Bureau of Mines and familiar with its work; the

information is included in uninterrupted combination canvasses (that is, bituminous coal-anthracite-coke).

Needs of Division.—Transfer of the major part of the personnel of the Division to the National Bituminous Coal Commission reduced appropriations to a point that has made it extremely difficult to continue the functions assigned by the Congress. To meet the requirements, additional funds should be appropriated for the Division's work.

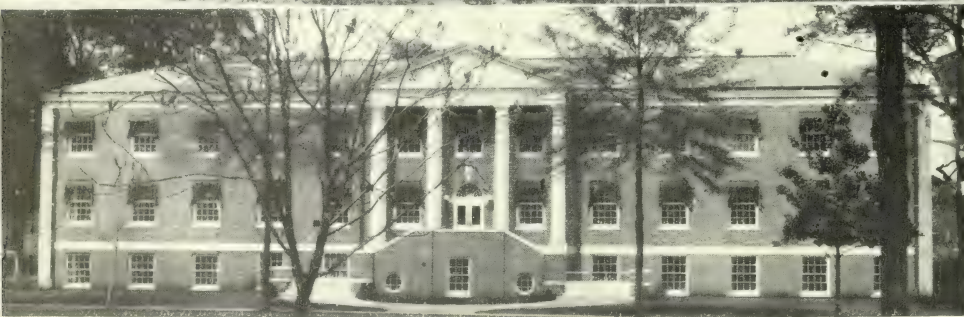
Prospective studies.—Anthracite.—Pennsylvania anthracite production has been dropping for about 15 years. The causes are both economic and technologic. The remedies for the ills of the anthracite industry lie in the same categories, but to date have not been worked out and applied broadly enough to be effective, if indeed they could be made effective in view of the present lack of control over some of the opposing forces. Study of this important problem as a whole is entirely beyond the present resources of the Coal Economics Division; however, it can and will continue to prepare statistics on production, distribution, and use that may be of assistance in solving the problem. Production statistics are already on a high plane of accuracy and completeness and will be maintained so by constant watchfulness. Distribution statistics are somewhat incomplete and sources of data largely secondhand. Special effort will be exerted in 1939 to raise them to a satisfactory standard. Consumption (use) statistics also are not well developed.

Coke.—Present statistics on byproduct coke are highly accurate as to production, but weak on transportation and distribution. The publication of distribution data annually (as in the report for 1936) would be useful to all concerned in the coke industry. Long intervals between reports, as at present, decrease their usefulness. Promptly issued information on the current movement of coke in commerce (transportation tables) would also be useful to both producers and consumers. Studies of the economics of the byproduct industry, such as supply, and present and potential demand, would also be valuable.

Petroleum Economics Division

The Petroleum Economics Division collected statistics on the production and consumption of petroleum and natural gas and their major products, assembled data and answered inquiries on all economic phases of these industries, and prepared monthly forecasts of demand.

Forecasts of demand.—The monthly forecasts of demand for motor fuel and crude petroleum continued to be a major feature of the



NEW BUREAU OF MINES BUILDINGS.

UPPER: PETROLEUM EXPERIMENT STATION AT BARTLESVILLE, OKLA.

MIDDLE: EASTERN EXPERIMENT STATION, COLLEGE PARK, MD.

LOWER: SOUTHERN EXPERIMENT STATION, TUSCALOOSA, ALA.

Division's work. These forecasts are of general interest to the industry and are particularly useful to the various State conservation agencies, as they contain the information necessary in devising programs to avoid waste and needless storage of crude petroleum. Revision of the form of the weekly crude-oil stock reports to show data by States as well as by districts has made possible current determination of the market demand for crude.

Field offices.—An additional appropriation was made available for strengthening the field work of the Division and for conducting special studies during the next fiscal year. In addition to the present office in California, a new office will be established in Oklahoma.

These offices will facilitate close contact with the field operations of the industry and with the activities of the various State agencies dealing with oil and gas; they will moreover serve as headquarters for field investigations.

Special studies.—Completion of an initial survey of crude-oil stocks, as of June 30, 1936, indicated that, in spite of losses in gasoline content, the average quality of crude oil in storage was surprisingly high, because such stocks generally represented flush production from new fields and there has been a remarkable improvement in storage facilities. The Division is prepared to continue a study of the economic relation of necessary working stocks to above-ground storage and underground reserves.

In connection with trends in market demand for crude by producing States, a more detailed investigation of crude runs, by refinery districts, and of interregional shipments of finished gasoline will be undertaken. These surveys should prove of particular interest and value to the industry.

Mineral Production and Economics Division

The Mineral Production and Economics Division collected production statistics for metal mining in the United States; supervised the compilation of the annual volume—Minerals Yearbook; gathered and analyzed the usual statistics on employment, accidents, and explosives as related to mining; and, in cooperation with the Works Progress Administration, continued the study of changes in mineral technology and output per man.

Metal-mine statistics.—Preliminary reviews of metal mining in the 13 Western States that produce nonferrous metals were released between January 10 and January 19. These were followed by summary reports on gold, silver, copper, lead, and zinc. By the end of June, final detailed statistics for metal mining were completed for all States except Arizona.

Minerals Yearbook.—Minerals Yearbook, 1937, was issued in August 1937. The volume included several general chapters as well as the customary commodity reviews and comprised 1,502 pages. Demand for this annual official review of the mining industry has been unabated.

The manuscript for Minerals Yearbook, 1938, was submitted for transmittal to the Public Printer on June 25, 1938. Because of the necessity for keeping within the printing budget, the size of the volume was reduced to 1,339 pages. This edition contains detailed final figures for 1937 that cover all mineral commodities but bituminous coal, coke, petroleum, natural gas, and natural gasoline. Final statistics on Pennsylvania anthracite, stone, sand and gravel, cement, and lime are presented for the first time in any Yearbook.

Each chapter that was completed before June 10 was issued as promptly as possible as a preprint, instead of waiting to reprint the material after the Yearbook is issued. Some such chapters were thus published early in May, and 47 had been printed and distributed before the volume was off press.

Employment and accidents.—The division made its annual statistical surveys of the causes of accidents and the number of men employed at mines and quarries. Owing to lack of comparability of State casualty records due to variations in State laws with regard to classes of mines and types of accidents covered by local legislation, the Bureau of Mines is supplied with voluntary and uniform reports by the operating companies.

Four accident-prevention contests were conducted, with 399 mines and quarries in 39 States participating. Safety trophies were awarded to companies that established the best accident-prevention records, as determined by a statistical analysis of the contestants' reports of accidents and man-hours of exposure to occupational hazards.

Reports were also obtained from manufacturers of explosives showing the quantity used in the mineral industries, the chief consumers of explosives used for industrial purposes in the United States.

Changes in mineral technology and output per man.—In cooperation with the Works Progress Administration, the division continued the study of technologic changes and output per man in selected American mineral industries. Three reports were published during the year. Other reports nearing completion show technologic changes in the petroleum, metal-mining, phosphate rock, and crushed-stone industries and their effect on production and employment.

Conclusions and recommendations.—Although the work of the Division is efficiently conducted, important phases of its activity are necessarily being neglected through lack of the requisite personnel. Additional personnel is needed for compiling the historical record of metal mining and the detailed analysis of statistics on mine accidents, for expanding the collection of accident statistics to include the petro-

leum industry, and for making needed studies of broad, economic problems with which the mining industry is vitally concerned.

Metal Economics Division

The Metal Economics Division serves the mineral industry, various Government agencies, and the public through its statistical and economic surveys of the metal industries. During the fiscal year 1938 the division conducted 55 statistical canvasses, prepared 65 publications, and answered over 2,700 requests for information.

Strategic minerals.—Recent interest in national defense has focused attention on the fact that the United States depends largely upon overseas supplies for such important mineral raw materials as manganese, tin, chromite, tungsten, and other metals indispensable to industry in peace as well as in war. Congressional committees and various executive departments studying deficiency mineral problems have consulted specialists of the Metal Economics Division frequently and have been given the benefit of data collated by them.

Other interested persons not connected with the industry have also made an exceptionally large number of requests for authoritative information on strategic minerals.

Secondary metals.—The importance of scrap as a source of metalliferous raw materials has long been recognized by the Bureau of Mines, and it is gratifying to record that the Congress has provided funds that will permit expansion of the Bureau's services to those engaged in the salvaging of waste metals. A secondary metals section will be established at the Bureau's Central Experiment Station (Pittsburgh, Pa.) early in the fiscal year 1939, to assist the secondary metals industry by compiling comprehensive statistics on production, consumption, and flow of scrap metals as well as other data that will contribute to the efficiency of the scrap trade.

Conclusions and recommendations.—The substantial increase in the number of requests for information during the past year demonstrates that the Division is rendering effective service to industry and the public. Its efficiency would be increased substantially if the marketing phases of the metal industries could be investigated more thoroughly. In addition, there is urgent need for data on the industrial uses of silver and the strategic minerals and on consumers' stocks of metals. Funds should also be made available to permit specialists to keep informed of new developments by direct field contact with the metal industries.

Nonmetal Economics Division

Minerals Yearbook chapters.—The Nonmetal Economics Division established a new record in completing statistics and text for the 19 chapters, covering more than 80 commodities, now prepared for

Minerals Yearbook. All final statistics have never been available before until late Autumn; in 1938 individual chapters were in print months ahead of any previous year. This achievement is the more remarkable because, in forming the Division 2 years ago, the staff assigned to fundamental economic and statistical studies of non-metals was smaller than that which formerly handled these subjects. Ability to do more and better work in spite of this handicap may be attributed to careful planning, elimination of requests for unnecessary data, and simplification of questionnaire forms to make them easier for producers to fill out.

Phosphates.—Recognizing the growing public interest in phosphates, the Division in 1937 inaugurated a midyear production canvass and report on phosphate rock, and the annual review was expanded to afford a more complete summary of the industry. Supplementary data were also furnished the joint committee appointed by the Seventy-fifth Congress to study phosphates, and the copious files of the Division will yield additional data if needed.

Publications.—Several articles by members of the staff, including the usual annual summaries of technologic progress, were published during the year by technical and trade journals and professional societies, and five reports were issued as information circulars. Other reports, including two general surveys and several marketing reviews, were completed but await funds for publication.

Service given by division.—As the main repository of information on a diversified group of industries marketing a billion dollars' worth of products a year, the Division is asked to answer monthly 350 to 500 inquiries from the public and more than 30 Government agencies. Organization of a Nonmetals Division in the Technologic Branch and the numerous information circulars prepared by the staff before the 1933 retrenchment have reduced to a minimum the requests that have to be referred to the Nonmetal Economics Division for a special reply.

Conclusions and recommendations.—In addition to maintaining a current record of significant technologic and commercial trends as affecting nonmetallics and gathering statistics thereon, the most important service of the Division is in the marketing field. Lists of buyers of all merchantable minerals are available, and practical help is given small operators daily as to how and where to sell their products. However, the Division is handicapped by shortage of funds in its efforts to make this service as effective as it should be.

Foreign Minerals Division

For at least 2 years world-wide attention has been focused upon the national defense and armament programs of the major world powers. During the past fiscal year the efforts of Germany, Italy,

and Japan and the less intensive attempt of several other nations to attain self-sufficiency as to raw materials were accelerated to such an extent that the economic equilibrium of the world as a whole has become badly distorted. Stringent foreign-exchange-control systems, discriminatory bilateral trade arrangements, and numerous other forms of Government restrictive regulations, now operative in several countries, affect American industry and foreign trade adversely in certain instances.

The problem of acquiring adequate supplies of mineral raw materials, which is common to many foreign countries, must be solved and must be considered a major factor in any analysis of the policies adopted by such countries as Germany, Italy, and Japan and the effects thereof.

Foreign Minerals Quarterly.—To provide factual information on the mineral resources, annual production, foreign trade, and Government control measures regulating the mining and metal-consuming industries in foreign countries, the Foreign Minerals Division in January 1938 published the first issue of *Foreign Minerals Quarterly*. Volume 1, number 1, discussed the mineral resources, production, and trade of eight countries in eastern Europe; subsequent issues described current economic conditions in Germany, Italy, Japan, and the Union of Soviet Socialist Republics.

Foreign mineral specialist.—In July 1937 the Bureau's foreign mineral specialist established headquarters at the American Embassy in Paris, France. In cooperation with the staffs of the American consulates at Paris and Brussels, comprehensive surveys of the mineral resources of France and Belgium and their colonies were prepared. These reports provided the basic material for two issues of the *Foreign Minerals Quarterly*. In May 1938 the specialist transferred his headquarters to London, where he will complete studies on the European iron and steel, copper, lead and zinc, coal, and petroleum industries.

Consular reporting service.—A cooperative arrangement between the Department of State and the Bureau of Mines, whereby the former, through its Foreign Service, supplies voluntary and requested reports on various phases of foreign mineral economics, has proved very helpful and beneficial to the Bureau. During the fiscal year, 2,390 reports were received from Europe; the majority were published from time to time in various monthly and quarterly periodicals issued by the Economics and Statistics Branch.

HEALTH AND SAFETY BRANCH

The Health and Safety Branch, comprising the Health and Safety Divisions, conducted safety training, answered emergency calls for

aid after catastrophes at mines and mineral plants, and studied conditions that affect the health of workers.

Health Division

The work of the Health Division concerned the effect of the working environment on the health of employees in the mineral industries. Studies were conducted on the composition of mine and tunnel air, determination and control of air dustiness, composition of Diesel exhaust gas, compressed-air illness, and respiratory protective devices.

Determination of dust.—Significant progress was made in developing and improving methods for calculating air dustiness. Six papers were published giving the results of this work, which especially emphasized application of the Bureau's midget impinger for dust sampling. The information thus made available should be of great practical importance in evaluating health hazards in dusty occupations.

Considerable progress was made in developing procedures for determining the composition of air-borne dust. Studies were made of the applicability of petrographic, spectrographic, and X-ray procedures to this problem. This information is of fundamental importance in ascertaining the health hazards of various types of dust.

Dust control.—Four papers on the generation and control of dust from drilling and blasting were published. Much of the work on this problem is being conducted in the Mining Division's testing adit at Mount Weather, Va.

Respiratory protective devices.—Much interest was shown in the Bureau's approval of respiratory protective devices, as evidenced by the fact that 12 new approvals were granted and 6 additional approvals virtually completed. This work of the Bureau helps to assure safe, satisfactory, and reliable respiratory protective devices for use in nearly all kinds of atmospheric contaminants.

Diesel exhaust gas.—Great interest has been shown in the possibility of using Diesel engines in mines and tunnels. To evaluate the health hazards that might be experienced in using such engines underground a study of the composition of Diesel exhaust gas is being conducted in cooperation with the Explosives Division. Approximately 800 samples of gases evolved from use of Diesel engines have been analyzed to date by the Health Division.

Mine gases.—About 1,000 analyses were made during the year of mine gases taken in connection with studies of mine explosions, the control and extinguishing of mine fires, and the promotion of safe and hygienic working conditions in and around mines. Two papers were published, one on gas analysis and one giving pertinent information on mine gases.

Compressed-air illness.—An investigation of possible methods of reducing compressed-air illness has been started in cooperation with

the United States Public Health Service and the Port Authority of New York. The rate of nitrogen elimination from the body when breathing oxygen was determined. This information is a necessary prelude to the development of methods for preventing compressed-air illness.

Safety Division

Personnel.—The Safety Division personnel included 26 engineers, 26 safety instructors, 15 clerks, and 7 other employees, a total of 74. Members of the division were assigned to duty fairly evenly through the various mining States, being headquartered at 17 cities.

Training courses.—In the past year the Safety Division gave the full Bureau of Mines training courses in first aid and mine rescue to 105,093 persons in the mining and allied industries, visiting 690 communities in 38 States, compared with 69,662 persons so trained in 1937. Since its inception in 1910, the Bureau has given its complete courses in first aid and mine rescue to the following numbers of persons, arranged by branches of the mining industry: Coal mining, 835,581; metal mining, 130,280; petroleum industry, 87,587; metallurgical plants, 30,553; nonmetallic mining, 14,845; cement plants, 13,553; tunnel work, 5,950; and miscellaneous mining activities, 28,505—a total of 1,146,854. Those who have taken these courses not only are prepared to render assistance to fellow workmen but are competent to give first-aid treatment to injured persons when off duty. It is estimated that at least 200 lives are saved annually by Bureau of Mines first-aid graduates.

During the past year, 1,902 persons in 30 States qualified to teach first-aid courses and were given provisional first-aid instructors' certificates, raising the total number to 9,454 issued since 1930. Certificates of 100-percent first-aid training were issued to 256 mines or plants in 25 States wherein every person had taken the Bureau of Mines first-aid course; to June 30, 1938, these certificates of 100-percent first-aid training had been issued to 1,910 plants.

In the course of the year, 198 expert mine rescue men took the Bureau advanced course in mine rescue and recovery operations and earned certificates, bringing the total to 3,163. The Bureau accident-prevention course for higher officials in coal mining was given in 5 States to 1,297 officials; in all, 7,659 of these certificates have been issued to mine officials since 1930.

Contact with mining industry.—The 50 men normally engaged in field work of the Safety Division in ordinary years come in contact with more than 300,000 persons in mining and its associated industries, teaching them the results of the Bureau's accumulated knowledge on safety; it is estimated that during the past year, however, the field personnel reached at least 500,000 persons. Only 2 of the 10 all-

steel safety cars were in active use; 41 passenger automobiles and 14 automotive trucks were operated and traveled 727,427 miles.

Mine fires and explosions.—In the course of the year 29 mine explosions in 12 States and 26 mine fires in 12 States were investigated, and the Bureau personnel aided in rescue or recovery work at practically all of these where life was involved. There were 8 major fire or explosion disasters (those in which 5 or more lives were lost); in these, 146 were killed, a substantial increase compared to the previous year; however, even this record is a tremendous improvement when compared to the annual average of 17 major disasters and 562 fatalities from them in the 4 years that preceded establishment of the Bureau in 1910. Without doubt, much of the relative immunity from mine fire and explosion disasters now enjoyed in the United States is due to various phases of safety work promoted by the Bureau. One such activity is the advocacy of rock dusting, a practice now known definitely to prevent the occurrence of many widespread explosions yearly. There is reliable evidence that for the past 8 to 10 years, rock dusting alone has prevented several hundred fatalities annually in United States coal mines.

Fifty-five miscellaneous accidents in 20 States (including those from roof falls, explosives, electricity, and other causes) were investigated, as well as numerous surface explosions of black powder, dynamite, pulverized fuel, and gas.

Mine reports.—Two hundred and thirteen reports were made on safety conditions at individual mines or mineral plants in 31 States during the year. Some of these were transmitted confidentially to the operating company, with constructive criticism of existing conditions and definite recommendations for improvement. These reports, with verbal suggestions by Bureau men during or after the inspections upon which the reports were based, resulted in hundreds of important alterations in operating conditions (equipment, methods, and practices), with resultant favorable influence on the prevention of accidents. Numerous changes of this type have been reported by field men, and several hundred letters were received during the year from mining people voicing appreciation of this and other services.

Other activities.—The personnel of the Safety Division assisted in conducting 74 first-aid contests in 21 States; prepared and conducted 50 safety exhibits and demonstrations in 12 States; attended 625 safety meetings in 33 States; and prepared 60 manuscripts for publication. As a means of disseminating safety knowledge, sound was reproduced on three silent motion pictures and the latter presented before more than 25,000 interested persons, chiefly in the mining industry.

Ten new safety clubs (Holmes Safety Association chapters) were organized in 3 States; in all, 472 of these mining-community safety

organizations have been established, scattered throughout 28 States. Numerous special studies were made of rock dusting, ventilation, electricity, haulage, air conditioning, wetting methods, detecting gases, testing roof, reducing air dustiness, and other health and safety problems of the mineral industries.

Conclusions and recommendations.—The services of the Safety Division are in greater demand than at any time in its history; unfortunately, with its limited personnel only a portion of the requests for help can be filled. The popularity of training in first aid is so great that other important work of the Division has suffered because of the necessity to divert personnel to this activity. The increase in coal-mine explosion fatalities during the past year shows a need for greater educational work on accident prevention, and some of the engineers loaned for first-aid training work last year must be returned to accident-prevention duties; this will leave a shortage of personnel both for first-aid training and for the numerous other activities in which the Division engages.

The accident rate in mining has been much lower during the past 5 years than in any other period in the history of the industry in the United States, insofar as statistics are available. The excellent safety records of numerous individual mining companies, working under hazardous conditions, show definitely that mine accidents in this country can be reduced at least 75 percent below their present rate if known feasible practice is followed strictly. It is the unswerving ambition of the Safety Division to assist in bringing about this reduction.

ADMINISTRATIVE BRANCH

The Administrative Branch comprised the Information and Office Administration Divisions.

Information Division

The work of the Information Division included the editing and distribution of publications, supervision of motion-picture production and circulation, maintenance of the Bureau library, and preparation of exhibits.

Editorial.—During the fiscal year 13 bulletins, 12 technical papers, 1 miners' circular, 70 separate chapters comprising Minerals Yearbook, 1938, 1 schedule, 1 cumulative list and index of publications, 12 monthly lists of publications, and 1 motion-picture list were edited and sent to the printer—a total of 111 printed publications. Moreover, during the year 70 chapters from Minerals Yearbook, 1937, were prepared for publication, and 11 other publications were reprinted. Owing to lack of printing funds, however, only a part of the Bureau's output could be printed at Government expense; consequently, 187 papers were submitted for publication in the technical and trade press.

The editorial section also edited 58 reports of investigations and 66 information circulars, papers that supply promptly to the mining industry and the general public results of Bureau investigations that are usually described in detail in later printed reports, or that give salient facts on the mineral industries in concise form suitable for use in reply to queries. In addition, 16 periodical and miscellaneous reports were edited.

These reports, 519 in all, involved the editing of 23,528 pages of manuscript.

Publications.—During the fiscal year, 196,375 copies of the free editions of Bureau publications and approximately 300,000 reports of investigations, information circulars, and monographs were distributed by the publications section. These were sent, however, only as the result of a direct request either for a specific publication or for all publications on a particular subject. In addition, the Superintendent of Documents sold about 100,000 copies of the Bureau's printed reports.

Numerous brief statements announcing the issuance of new publications or describing current investigations were supplied to the daily and technical press. These short items were printed widely and effectively acquainted the public with the results of the Bureau's work.

More than 72,000 letters requesting publications or information on the Bureau's activities and general mining subjects were received and answered.

Motion-picture production.—As a means of disseminating information on safety and efficiency in the mineral industries, the Bureau maintains what is perhaps the largest library of educational motion-picture films in the world. These films are prepared under the supervision of the division, through the cooperation of industrial concerns that bear the entire cost of production and that of providing copies for distribution.

During the year, three new film subjects were added to the library, and seven subjects were revised.

Motion-picture circulation.—Circulation of the Bureau's motion-picture films, and other graphic services, such as drafting and photography, are centralized in the Pittsburgh Experiment Station, but there are 16 subdistributing centers for films throughout the country, selected with regard to accessibility. The films are loaned to schools, churches, civic and business clubs, miners' local unions, and similar organizations. No charge is made for use, but exhibitors are asked to pay transportation charges. On June 30, 1938, the Bureau had 2,164 sets of films, including 4,095 reels, aggregating 2,182,530 feet. During the year the films were shown on 102,637 occasions to an attendance of 10,351,700 persons. The attendance was 15 percent higher than in the fiscal year 1937.

Library.—The year's accessions to the library comprised 3,884 books and pamphlets, 364 periodicals were received currently, and 5,778 books were loaned for use outside the library.

Exhibits.—The division prepared, installed, and supervised, at expositions and conventions, 11 exhibits illustrating Bureau activities.

Office Administration Division

The Office Administration Division is charged with handling personnel matters, property records, accounting, multigraphing and mimeographing, and general administrative routine.

Property.—Records of the Bureau, as of June 30, 1938, show the following valuation of Bureau property:

Automobiles and trucks.....	\$101, 169. 26
Canvas and leather goods.....	3, 576. 77
Drafting and engineering instruments	12, 357. 29
Electrical equipment.....	47, 508. 88
Hardware and tools.....	37, 708. 33
Household equipment.....	20, 532. 96
Laboratory apparatus.....	556, 087. 76
Medical equipment.....	13, 800. 05
Office furniture and equipment.....	371, 032. 04
Photographic apparatus.....	36, 922. 03
Machinery and power plant equipment.....	1, 081, 285. 03
Land, buildings, and improvements	2, 511, 911. 48
Rescue cars and specialized apparatus.....	414, 157. 93
	<hr/> 5, 208, 049. 81

This property is in Washington and at the various field stations and offices of the Bureau.

Personnel.—On June 30, 1938, there were 737 full-time employees on duty in the Bureau, distributed as shown in the following table:

	Classification and number of appointees				
	Profes- sional	Subprofes- sional ¹	C. A. F.	Custodial ²	Total
Washington.....	³ 37	3	137	9	186
Pittsburgh.....	⁴ 95	39	61	46	241
Field.....	⁵ 157	44	62	47	310
Total.....	289	86	260	102	737

¹ Includes instrument makers, safety instructors, laboratory aids, assistants, etc.

² Includes laborers, mechanics, messengers, etc.

³ Engineers, 16; chemists, 3; miscellaneous, 18; total, 37.

⁴ Engineers, 45; chemists, 31; miscellaneous, 19; total, 95.

⁵ Engineers, 80; chemists, 32; miscellaneous, 45; total, 157.

141

66

82

289

In addition to the foregoing full-time employees, the following 154 employees held appointments on a when-actually-employed basis: 54 consultants; 59 excepted; 12 classified; 5 unclassified, and 24 employed on field agreements. This brings the total enrollment to 991 employees.

FINANCES

The total funds available to the Bureau of Mines for the fiscal year ended June 30, 1938, including direct appropriations, departmental allotments, reappropriated balances, and sums transferred from other departments for service work, were \$2,421,880.61. Of this amount \$2,368,863.25 was spent, leaving an unexpended balance of \$53,017.36. On the regular work of the Bureau, \$2,291,514.45 was expended. This figure is subject to slight corrections due to unpaid obligations.

Table 1 presents classified and complete information regarding the financial history of the Bureau since its establishment in 1910.

Tables 2 gives a statement of the distribution of Congressional appropriations to the branches and divisions and the expenditure of these funds in 1938, by Bureau divisions.

TABLE 1.—Bureau of Mines Appropriations and Expenditures, Fiscal Years Ended June 30, 1911–38

Fiscal year	Appropriated to Bureau of Mines	Departmental allotments ¹	Funds transferred from other departments ²	Total funds available for expenditure	Unexpended balances	Total expenditures	Expenditures exclusive of service items ³
1911.....	\$502,200.00	\$34,200.00	-----	\$536,400.00	\$22,818.27	\$513,581.73	\$513,581.73
1912.....	475,500.00	45,640.00	-----	521,140.00	6,239.77	514,900.23	514,900.23
1913.....	553,100.00	47,850.00	-----	630,950.00	4,087.20	626,862.80	626,862.80
1914.....	684,000.00	57,307.79	-----	721,307.79	4,678.29	716,629.50	716,629.50
1915.....	730,500.00	55,424.60	-----	785,924.60	4,178.11	781,746.49	781,746.49
1916.....	757,300.00	48,710.87	-----	806,010.87	9,058.63	796,952.24	796,952.24
1917.....	981,060.00	52,400.00	-----	1,033,460.00	48,588.10	984,871.90	984,871.90
1918.....	1,467,070.00	51,901.98	\$3,062,000.00	4,580,971.98	395,745.10	4,185,226.88	1,172,939.64
1919.....	3,245,285.00	49,542.86	\$8,600,000.00	11,894,827.86	2,452,236.78	9,442,591.08	1,137,471.37
1920.....	1,216,897.00	52,800.00	-----	1,269,697.00	9,592.18	1,260,104.82	1,245,891.36
1921.....	1,362,642.00	62,618.72	666,720.00	2,091,980.72	13,985.89	2,077,994.83	1,412,923.15
1922.....	1,474,300.00	59,800.00	182,200.00	1,716,300.00	52,120.45	1,664,179.55	1,483,038.47
1923.....	1,580,900.00	70,814.30	97,100.00	1,748,814.30	10,959.08	1,737,855.22	1,640,840.57
1924.....	1,784,959.00	50,710.00	347,820.00	2,183,489.00	38,085.43	2,145,403.57	1,804,800.41
1925.....	2,028,268.00	57,500.00	236,465.86	2,322,233.86	107,743.20	2,214,490.66	1,998,669.20
1926.....	1,875,010.00	81,220.00	510,501.15	2,466,731.15	28,891.78	2,437,839.37	1,841,150.80
1927.....	1,914,400.00	94,443.39	325,000.00	2,333,843.39	44,871.29	2,288,972.10	1,926,910.12
1928.....	3,025,150.00	113,266.45	328,000.00	3,466,416.45	7,736,235.62	2,730,180.83	1,997,270.66
1929.....	2,725,113.00	103,000.00	205,500.00	3,033,613.00	152,701.34	3,600,303.33	2,280,960.68
1930.....	2,274,670.00	123,300.00	166,200.00	2,664,170.00	135,714.93	2,548,671.45	2,216,995.72
1931.....	2,745,060.00	120,680.91	166,500.00	3,032,240.91	195,534.37	2,939,060.73	2,304,121.45
1932.....	2,278,765.00	137,866.48	194,500.00	2,770,712.18	344,689.43	2,426,022.75	2,186,799.92
1933.....	1,860,325.00	75,100.00	184,000.00	2,361,138.96	475,895.41	1,885,243.55	1,710,949.42
1934.....	1,574,300.00	50,230.00	17,000.00	1,872,586.00	397,131.28	1,475,454.76	1,254,846.72
1935.....	1,293,959.07	50,000.00	126,513.10	1,520,472.17	34,154.47	1,486,317.70	1,349,490.11
1936.....	1,970,311.00	69,500.00	47,570.00	2,114,966.51	14,074.34	2,100,892.17	2,052,751.87
1937.....	2,093,200.00	69,000.00	65,000.00	2,227,812.45	8,132.14	2,221,680.31	2,162,887.03
1938.....	2,222,450.00	83,000.00	62,300.00	2,421,880.61	53,017.36	2,368,863.25	2,291,514.45
1939.....	2,808,735.00	87,790.00	60,000.00	2,998,221.70	-----	-----	2,358,550.00

¹ Includes printing and binding, stationery, and contingent funds.

² Includes proceeds from sales of residue gas.

³ Service items include Government fuel yards, helium, and other investigations and services for other departments.

⁴ Includes gas investigations for War Department.

⁵ Includes \$1,586,388 for Government fuel yards.

⁶ Includes War Minerals Relief Commission, \$8,500,000.

⁷ Includes \$719,476.67 unexpended balance reappropriated.

⁸ Includes \$120,216.38 unexpended balance reappropriated.

⁹ Includes \$102,354.19 unexpended balance reappropriated.

¹⁰ Includes \$159,550.70 unexpended balance reappropriated.

¹¹ Includes \$241,713.96 unexpended balance reappropriated.

¹² Includes \$231,056.04 unexpended balance reappropriated.

¹³ Includes \$50,000 unexpended balance reappropriated.

¹⁴ Includes \$27,585.51 unexpended balance reappropriated.

¹⁵ Includes \$2,612.45 unexpended balance reappropriated.

¹⁶ Includes \$3,819.17 unexpended balance reappropriated and \$40,311.44 receipts from sale of helium and other products.

¹⁷ Includes \$41,696.70 unexpended balance reappropriated.

¹⁸ Estimate.

TABLE 2.—Bureau of Mines Expenditures, Fiscal Year 1938—Continued

Branch or division	Gen- eral ex- penses	Operating rescue cars and sta- tions and investiga- tions of accidents	Testing fuel	Mineral mining investi- gations	Oil and gas in- vestiga- tions	Expenses mining exper- iment stations	Econom- ics of mineral indus- tries	Care, etc., build- ings and grounds, Pitts- burgh, Pa.	Ac- quire- ment of land, helium plant	Gas produc- tion, helium plants	Helium produc- tion	Appre- ciation of for- eign cur- rency	Develop- ment and operation helium properties (special fund)	Print- ing and binding	Conti- nent	Total
Economics and Statis- tics Branch:																
Coal Economics Division.....							\$25,683							\$386		\$26,069
Mineral Produc- tion and Eco- nomics Division.....							88,169							26,514		114,683
Nonmetal Eco- nomics Division.....							50,324							1,111		51,435
Foreign Minerals Division.....							25,119					\$400		37		25,556
Metal Economics Division.....							37,594							463		38,057
Petroleum Eco- nomics Division.....							57,180							717		57,897
Total.....							284,069					400		29,228		313,697
Health and Safety Branch:																
Safety Division.....		\$289,126												13,652		302,778
Health Division.....		48,981												396		49,377
Total.....		338,107												14,048		352,155
Total appropriation.....	\$65,500	624,000	\$250,400	\$270,890	\$253,000	\$359,000	300,000	\$87,690	\$10,000	\$12,000	\$63,819	2,300	\$40,311	78,000	\$5,000	2,421,880
Total expenditures.....	65,484	623,558	250,047	270,458	252,538	358,669	299,956	87,439	9,961	4,954	56,485	400	5,949	77,998	4,987	2,368,863
Balances.....	16	442	353	402	462	331	64	251	39	7,046	7,334	1,900	34,362	2	13	53,017



PUEBLO WOMEN MAKING BOWLS. THEIR PRODUCTS ARE SOLD THROUGH THE INDIAN ARTS AND CRAFTS BOARD.

OFFICE OF INDIAN AFFAIRS

John Collier, *Commissioner*

IN ALL our colorful American life there is no group around which there so steadfastly persists an aura compounded of glamour, suspicion and romance, as the Indian. For generations, the Indian has been, and is today, the center of an amazing series of wonderings, fears, legends, hopes.

Yet those who have worked with Indians know that they are neither the cruel, warlike, irreligious savages imagined by some, nor are they the "fortunate children of nature's bounty" described by tourists who see them for an hour at some glowing ceremonial. We find the Indians, in all the basic forces and forms of life, human beings like ourselves. The majority of them are very poor people living under severely simple conditions. We know them to be deeply religious. We know them to be possessed of all the powers, intelligence, and genius within the range of human endowment. Just as we yearn to live out our own lives in our own ways, so, too, do the Indians, in their ways.

For nearly 300 years white Americans, in our zeal to carve out a nation made to order, have dealt with the Indians on the erroneous, yet tragic, assumption that the Indians were a dying race—to be liquidated. We took away their best lands; broke treaties, promises; tossed them the most nearly worthless scraps of a continent that had once been wholly theirs. But we did not liquidate their spirit. The vital spark which kept them alive was hardy. So hardy, indeed, that we now face an astounding, heartening fact.

THE INDIANS ARE NO LONGER A DYING RACE

Actually, the Indians, on the evidence of Federal census rolls of the past 8 years, are increasing at almost twice the rate of the population as a whole.

With this fact before us, our whole attitude toward the Indians has necessarily undergone a profound change. Dead is the centuries-old notion that the sooner we eliminated this doomed race, preferably humanely, the better. No longer can we, with even the most generous intentions, pour millions of dollars and vast reservoirs of energy, sympathy, and effort into any unproductive attempts at some single,

artificial permanent solution of the Indian problem. No longer can we naively talk of or think of the "Indian problem." Our task is to help Indians meet the myriad of complex, interrelated, mutually dependent situations which develop among them, according to the very best light we can get on those happenings—much as we deal with our own perplexities and opportunities.

We, therefore, define our Indian policy somewhat as follows: So productively to use the moneys appropriated by the Congress for Indians, as to enable them, on good, adequate lands of their own, to earn decent livelihoods and lead self-respecting, organized lives in harmony with their own aims and ideals, as an integral part of American life. Under such a policy, the ideal end result will be the ultimate disappearance of any need for Government aid or supervision. This will not happen tomorrow; perhaps not in our lifetime; but with the revitalization of Indian hope due to the actions and attitudes of this Government during the last few years, that aim is a probability, and a real one.

Such being the policy, expressed necessarily in general terms, let us see, concretely and specifically, how, and to what extent, this policy has been approached during the fiscal year ending June 30, 1938.

In looking at the Indian picture as a social whole, we will consider certain broad phases—land use and industrial enterprises, health and education, roads and rehabilitation, political organization—which touch Indian life everywhere, including the 30,000 natives of Alaska for whose health, education, and social and economic advancement the Indian Service is responsible.

Lastly, this report will tell wherein the Indian Service, or the Government's effort as a whole for the Indians, still falls short.

INDIAN LANDS

So intimately is all of Indian life tied up with the land and its utilization that to think of Indians is to think of land. The two are inseparable. Upon the land and its intelligent use depends the main future of the American Indian.

The Indian feels toward his land not a mere ownership sense but a devotion and veneration befitting what is not only a home but a refuge. At least 9 out of 10 Indians remain on or near the land. When times are good, a certain number drift away to town or city to work for wages. When times become bad, home to the reservation the Indian comes, and to the comparative security which he knows is waiting for him. The Indian still has much to learn in adjusting himself to the strains of competition amid an acquisitive society; but he long ago learned how to contend with the stresses of nature. Not only does the Indian's major source of livelihood derive from the land, but his social and political organizations are rooted in the soil.

A major aim, then, of the Indian Service is to help the Indians to keep and consolidate what lands they now have and to provide more and better lands upon which they may effectively carry on their lives. Just as important is the task of helping the Indian make such use of his land as will conserve the land, insure Indian self support, and safeguard or build up the Indian's social life. Many subsequent chapters of this report deal with this latter task.

In 1887, the General Allotment Act was passed, providing that after a certain trust period, fee simple title to parcels of land should be given to individual Indians. Individual proprietorship meant loss—a paradox in view of the Indian's love for the land, yet an inevitable result, when it is understood that the Indian by tradition was not concerned with possession, did not worry about titles or recordings, but regarded the land as a fisherman might regard the sea, as a gift of nature, to be loved and feared, to be fought and revered, and to be drawn on by all as an inexhaustible source of life and strength.

The Indian let the ownership of his allotted lands slip from him. The job of taking the Indian's lands away, begun by the white man through military expeditions and treaty commissions, was completed by cash purchase—always of course, of the best lands which the Indian had left. In 1887, the Indian had remaining 130,000,000 acres. In 1933, the Indian had left only 49,000,000 acres, much of it waste and desert.

Since 1933, the Indian Service has made a concerted effort—an effort which is as yet but a mere beginning—to help the Indian to build back his land holdings to a point where they will provide an adequate basis for a self-sustaining economy, a self-satisfying social organization.

By the close of the fiscal year 1938, the area of the lands held in trust for the Indians by the Government had been increased to approximately 51,540,307 acres—approximately 67 percent tribally owned, and 33 percent in allotments held in trust for the benefit of individuals.

A BEGINNING IS MADE

Under authority of the Indian Reorganization Act, Congress appropriated \$1,000,000 for the acquisition of land during the fiscal year 1936. For the fiscal year 1937, the sum of \$1,000,000 was again appropriated, and in addition the Secretary of the Interior was authorized to contract for an additional million dollars worth of land. The sum of \$950,000 was subsequently appropriated to meet these contractual obligations. During the fiscal year 1938, only \$500,000 was made available. As the result of these appropriations, there have been acquired for the Indians 169,769.83 acres, at a cost of \$2,207,145.40. Of these totals, 64,354.85 acres were purchased during the last fiscal year, at a cost of \$1,216,725.14.

Also since the passage of the Indian Reorganization Act, 392,487 acres of former Indian lands which had been opened to sale or entry have been restored to tribal ownership and reservation status of this amount 38,279 acres were restored during the fiscal year ending June 30, 1938.

From 1935 through the fiscal year 1938, 30 purchase projects have been conducted by the Commissioner of Indian Affairs in cooperation with the Governmental agencies now merged in the Farm Security Administration. Options in the amount of \$3,521,057, covering 1,207,916 acres in 11 States, have been accepted, and purchases have been completed to the extent of 94 percent. By Executive order, on January 18 and April 15, 1938, the President transferred jurisdiction over approximately 791,405 acres of these lands from the Department of Agriculture to the Department of the Interior. Another Executive order is pending, transferring an additional 132,329 acres. Administrative jurisdiction over the remaining 285,222 acres will be retained by the Department of Agriculture, subject to further study concerning the proper utilization of the land.

CONSOLIDATION AND SPECIAL PURCHASE PROJECTS

Consolidation of Indian lands is an important corollary of land acquisition. Negotiations are under way in South Dakota to exchange scattered Indian tracts for State and county lands, so that the holdings of the Indians' of the State and of the counties may be blocked into usable units. On the Cheyenne River Reservation, the exchange program involves approximately 133,000 acres of tribal allotted lands; on the Pine Ridge Reservation approximately 14,150 acres of tribal lands; and on the Standing Rock Reservation approximately 24,770 acres of tribal land. In working out these exchanges, the South Dakota authorities have been most cooperative.

In Florida, an exchange of 3,170.13 acres of scattered Seminole Reservation lands for other lands better suited to Indian purposes is nearing completion. The former State Seminole Reservation, comprising 99,000 acres in Monroe County, Fla., has been abolished by the State, and in its stead a new State reservation of 104,800 acres has been established in Broward County, adjoining Federal reservation lands in Hendry County.

The purchase of lands under the Arizona Navajo Boundary Extension Act of June 14, 1934 (48 Stat. 960), was continued with the purchase of 10,486.98 acres at a cost of \$17,159.45, bringing the total purchases under this act to 334,390.97 acres.

One hundred and twenty-nine acres of land were purchased for the Capitan Grande Indians of the Barona Ranch, Calif., at a cost of \$2,100.

Continued progress has been made in the purchase of land within the various pueblos in New Mexico with funds awarded pursuant to the Pueblo Lands Board Act, as amended. Purchases of 3,495.44 acres were completed involving an expenditure of \$57,534.36.

The act of May 31, 1938 (Public, No. 569, 75th Cong.), authorizes the Secretary of the Interior to withdraw and reserve permanently small tracts of not to exceed 640 acres each of the Alaskan public domain for schools, hospitals, and other purposes necessary to aid the Indians, Eskimos, and Aleuts of Alaska. This authority is proving of material assistance in the development of the Alaska program.

THE INDIANS DO THEIR PART

The Indians themselves are beginning to realize the folly of parting with their land holdings. Only four patents in fee were issued during the year to Indians, to relieve conditions of distress or because the land was needed for public or private projects.

A number of Indians have deeded their surplus or inherited lands or portions of them to the United States in trust for other Indians; usually for relatives who were landless or whose own lands were not suitable as home sites. Two Indians have deeded lands to the United States in trust for the tribe to which they belong. This, it is hoped, may be the beginning of a voluntary partial solution of the allotment situation.

A number of allotments have been exchanged between Indians in order better to consolidate their holdings or to acquire agricultural and grazing lands. Especially has this type of exchange been carried out on the Blackfeet Reservation in Montana, where many Indians have wished to acquire more and better farming lands, while others preferred to depend on larger grazing revenues.

Permits and leases for business purposes have increased somewhat since sales and patents in fee have been limited. On those reservations under the Indian Reorganization Act such permits and leases on tribal lands are now usually made by the tribal council.

COURT CASES AND TAX TROUBLES

During the fiscal year, 389.22 acres of land were restored to their original trust status through cancelation of five patents in fee issued to Indian allottees during the trust period without their application or consent. Cases involving approximately 75 allotments are pending in the Department of Justice, the majority of them cases in which it is sought to recover taxes illegally collected.

These cases do not include lands of the Five Civilized Tribes in Oklahoma, where suits have been instituted to remove clouds from the title and to recover possession of allotted or purchased lands for Indians.

As the result of the appropriation of \$25,000 made in pursuance of the provisions of the act of June 20, 1936 (49 Stat. 1542), needed relief has been given a number of Indians by the payment of past due taxes on properties purchased with trust funds and held under restricted deeds; the buyers having believed at the time of purchase that the property would be nontaxable.

A revision of the regulations to govern the sale of Indian lands, the issuance of patents in fee, and the purchase of lands with trust funds, including the Five Civilized Tribes in Oklahoma, was approved in the Department on May 31 of this year.

NAVAJO LEASES—NAVAJO BOUNDARY BILL

During the year an aggregate of 499,522.75 acres of white-owned land was leased for the benefit of Navajo Indians at an annual rental of \$16,273.96. The lands were leased pending acquisition, by purchase or exchange, of lands in Arizona under the provisions of the act of June 14, 1934 (48 Stat. 960), and the enactment of similar legislation applicable to New Mexico. The Arizona exchanges under the 1934 act are receiving attention at the present time, and it is hoped that they may be completed without much more delay. Legislation to extend the Navajo boundary in New Mexico will again be presented to Congress at its next session.

EXTENSION OF TRUST PERIOD

Trust periods were extended automatically by authority of the Indian Reorganization Act for all tribes which accepted that act. As a protection to those tribes which did not accept the act, the period of trust on lands which otherwise would have expired during the calendar year 1938 was extended by President Roosevelt on September 29, 1937, for a further period of 25 years.

EASTERN CHEROKEE CASES

On June 6, 1938, the contention of the United States on behalf of the Eastern Band of Cherokee Indians in North Carolina, regarding title to certain lands claimed for the Indians, was sustained by the United States Circuit Court of Appeals for the Fourth Circuit. Although the amount and value of land involved in the particular case was not large, the questions decided were important, since title to some 2,000 acres of land claimed for these Indians may depend on the determination of similar issues. A total of approximately 50 cases involving title to Cherokee Indian lands have been submitted to the Department of Justice, where they are under active consideration.

INDIAN TRIBAL CLAIMS

Final judgments in favor of the Klamath Tribe of Oregon and the Shoshone Tribe of the Wind River Reservation, Wyo., in the amount of \$5,313,347.32 and \$4,408,444.23 respectively, were rendered by the Court of Claims. Funds in satisfaction of these judgments were appropriated by the Second Deficiency Appropriation Act, fiscal year 1938, approved June 25, 1938 (Public No. 723, 75th Cong., 3d sess.).

The decisions in favor of these tribes in June, 1937, were appealed by counsel for the United States to the Supreme Court, where the decisions of the Court of Claims were affirmed.

In affirming the decisions of the Court of Claims in these two cases, the Supreme Court rendered decisions of great importance to the Indians. These two cases settled the question as to the scope of the title of an Indian tribe to the reservation set apart for it by treaty. In the Shoshone case, the Supreme Court held that the tribe's right of occupancy was as sacred and as securely safeguarded as in fee-simple absolute title, notwithstanding the fact that the United States retained the fee. Following this theory, it was held that the tribe's right of occupancy in perpetuity included ownership of the land, mineral deposits, and standing timber on the reservation, and an award was made accordingly. Interest on the sums found to be due at the time the reservation lands were taken was awarded both tribes as a part of just compensation for a taking of property by the United States in the exercise of its power of eminent domain.

Approximately 65 cases are now pending in the United States Court of Claims involving Indian tribal claims. Reports were made during the year to the Department of Justice and to the Court of Claims on seven cases. The court dismissed five cases with decisions adverse to the Indian tribes.

LEGISLATION

Reports were prepared and sent to the committees of Congress on some 300 bills relating to Indian affairs. Notable among the acts passed by the third session of the 75th Congress are the act of April 8, 1938 (Public, No. 474), amending the Menominee Jurisdictional Act of September 3, 1935 (49 Stat. L. 1085), to permit the filing of separate suits in the Court of Claims; the act of June 15, 1938 (Public, No. 632), to divide the funds of the Chippewa Indians of Minnesota between the Red Lake Band and the organized Minnesota Chippewa Tribe; the act of June 28, 1938 (Public, No. 754), conferring jurisdiction upon the Court of Claims to hear, adjudicate, and render judgment on the claims of the Ute Indians against the United States; and the act of June 28, 1938 (Public, No. 755), authorizing the Red Lake Band of Chippewa Indians to file suit in the Court of Claims.

IMPROVEMENT OF LAND RECORDS

During more than a century, approximately 15,000 maps, graphs, tracings, and similar records relating to Indian lands have accumulated in the Indian Office. The methods used for filing these records have not been adequate for their proper preservation. In April, 1938, a project was inaugurated for the repair, preservation, recording, indexing, and filing of these maps. The work of repairing and preserving the maps is being done under the direct supervision of the Division of Repair and Preservation of The National Archives.

It has not been possible heretofore to index adequately the records of deeds and similar documents relating to the status of Indian lands. As part of a Works Progress Administration project a comprehensive index of approximately 25,000 deeds is being prepared. Other records of the Records Section are also being carefully indexed.

PROBATE WORK

Due to legislation affecting Indians, the adoption of constitutions, bylaws, law and order regulations, and the establishment of tribal courts, the probate work of the Indian Office has grown greatly and its problems have multiplied.

The past year saw a considerable increase in probate output both in number of estates and value. Even so, a large number of estates still await action.

Indian Probate Work

Probate cases handled outside the Five Tribes and Osage Nation, 1937-38.....	1, 793
Wills considered for form and approved.....	431
Wills considered for form and rejected.....	85
Appraised value of estates probated.....	\$3, 357, 314. 80
Fees charged against estates.....	\$46, 675. 00
Average value of estates.....	\$1, 872. 45
Average fee for probate.....	\$26. 03

A conflict in the regulations covering allowance of claims against living Indians, and the allowance of creditors' claims against their estates, after they are dead, is now being studied with the purpose of making these regulations uniform. This situation has, in the past, caused considerable confusion, as it has been the practice to allow claims against an estate that have been denied against the living Indian.

Probate Work—Five Civilized Tribes

Total number of cases submitted.....	423
No intervention.....	250
Probate attorney appeared.....	83
Transferred to Department of Justice for intervention.....	37
Tax and attorney fees.....	53
Number of cases pending:	
Civil.....	171
Probate.....	2, 231
Number of court appearances.....	1, 698
Number of deed and lease approvals.....	354
Amount involved in court appearances.....	\$3, 829, 670. 97
Amount saved Indians.....	\$255, 289. 55

The work of the Five Civilized Tribes, passing through the Indian Office, is separately reported to the Department by the supervising probate attorney.

Work has continued in connection with Federal estate taxes in the Five Civilized Tribes. Practically all such cases have been concluded so far as adjustment with the Treasury Department is concerned, and court proceedings are now contemplated and in preparation on such matters as were impossible of settlement.

From Osage, Okla., 102 cases have been handled. Many of these are will contests involving large amounts of money. Some have required months of study, conferences with attorneys and other bureaus of the Department, and extensive correspondence.

CONSERVATION OF INDIAN RANGE AND FOREST LANDS

Of the lands remaining to the Indians, some 46,000,000 acres are in forest and range. As guide and supervisor in the field of forest and range management, the Indian Office, has, therefore, responsibility over a territory larger than the entire State of North Dakota.

The income from timber sales and the money value of timber used on the reservations, the income from grazing leases and permits, and the money value of free grass consumed by Indian livestock, constitute together one of the Indians' major sources of revenue.

Indian Forest Resources

Area:		
Timberland.....	acres..	6, 000, 000
Woodland.....	do.....	8, 000, 000
Total forest area.....	do.....	14, 000, 000
Timber:		
Volume.....	ft. b. m..	33, 000, 000, 000
Value.....		\$90, 000, 000
Timber production and sales, 1938:		
Total volume cut.....	ft. b. m..	426, 210, 000
Gross income from timber.....		\$1, 175, 620

Conservation, for the benefit not only of the Indian, but of the whole Nation, is, of course, the controlling policy in the administration of Indian grazing and forest lands. In no other field, through no other Federal bureau, does the Government enjoy such an opportunity to prove what can be accomplished in the way of conservation and proper land use as it does in the supervision by the Indian Service of the Indian domain. The Indian Service, through its position as guardian over Indian lands, can apply a concentrated technical knowledge and action directly to the problem.

Inevitably, of course, certain of the rules and regulations requisite to proper conservation and land use run counter to individual Indian interests. The Indian owner of a well-watered allotment may resent the order of the agency superintendent which prohibits him from leasing his land for the higher rental paid for agricultural land and requires him to reserve it as the key tract of a range unit and to take the lower payment per acre for grazing lands. Indian livestock owners fortunate enough to possess more than an average number of cattle and sheep are sometimes annoyed when told that, for the sake of their neighbors and for the preservation of the range, they must curtail their holdings. But the Indian country over, such instances of complaint and objection are comparatively few. The Indian tradition of common action for the common good is reborn, once the problem and the goal are understood. The Indian probably surpasses his white brother when it comes to accepting individual restraints in order that the community may prosper.

RANGE MANAGEMENT

The objectives sought in the management of Indian range resources, as stated in the General Grazing Regulations, may be concisely put as follows:

1. The preservation through proper grazing practice of the forest, the forage, the land, and the water resources on Indian reservations, and the building up of these resources where they have deteriorated.
2. The utilization of these resources for the purpose of giving the Indians an opportunity to earn a living through the grazing of their own livestock.
3. The granting of grazing privileges on surplus range lands not needed by the Indians in a manner which will yield the highest return consistent with undiminished future use.
4. The protection of the interests of the Indians from the encroachment of unduly aggressive and antisocial individuals.

Indian Range Lands

Total acreage-----	acres--	40, 000, 000
Great Plains: North and South Dakota, Montana, Wyoming-----	acres--	13, 000, 000
Intermountain: Idaho, eastern Washington, and Oregon do----		4, 000, 000

Indian Range Lands—Continued

Southwest: Utah, Colorado, Arizona, Nevada, New Mexico.....	acres.....	\$23, 000, 000
Open range.....	do.....	32, 000, 000
Woodland, grazed.....	do.....	8, 000, 000

Grazing Income and Livestock, Fiscal Year 1938

Income of Indians from grazing:

Total income from grazing.....	\$1, 420, 767
From lands grazed under paid permits or leases.....	693, 197
Cash value of free grazing by Indians.....	727, 570
Average income per acre.....	cents..... 3½

Number of Livestock Grazed on Indian Land

	Under permit or lease	Free, by Indians	Total
Cattle.....	152, 873	158, 274	311, 147
Sheep.....	603, 860	680, 126	1, 283, 986
Horses.....	2, 562	98, 084	100, 646

During the fiscal year ended June 30, 1938, the Indians enjoyed a gross income from their range lands of more than \$1,400,000; somewhat less than one-half of this amount coming in in cash payments paid by Indians and non-Indians for grazing privileges, and something more than one-half being made up by the money value of the grazing privileges enjoyed free of charge by Indian livestock operators.

TIMBER FOR TODAY—AND TOMORROW

In the management of the Indians' forest resources, as in the management of the range lands, conservation is the watchword. Wherever practicable, the cutting of timber is conducted strictly according to sustained yield practices. That is, the depletion of the timber supply is geared down to the rate of reproduction so that the Indians may enjoy their forest resources in perpetuity. In certain cases, unfortunately, sustained yield practices cannot be followed. Overripe timber or trees damaged by fire or insects must be cut. The demands of Indians owning timbered allotments cannot always be rejected, and the timber must be turned into the cash which the owners insist upon having. The goal, however, remains a sustained yield policy extended over all Indian forest lands.

Of an estimated 33,000,000,000 feet of timber on Indian lands, approximately 426,000,000 feet were cut during the fiscal year 1938, bringing to the Indians a gross income of approximately \$1,175,000. During the year, new contracts were completed covering the sale and future cutting of 270,290,000 feet of timber on seven units located on four reservations.

During the fiscal year, range investigations and timber surveys initiated during 1937 were continued and completed. The policy of selective logging on Indian lands was standardized and strengthened through the formulation of standard marking regulations which promise a more effective balancing of age classes. In cooperation with the Civilian Conservation Corps—Indian Division, pine beetle control work has been continued on the Klamath, Warm Springs, and Yakima Reservations. Favorable weather conditions made this work particularly effective, especially on the latter two reservations. A serious pine beetle epidemic still exists at Klamath. The current timber sale policy, however, is resulting in the salvaging of a substantial volume of mature timber annually, and the elimination of trees susceptible to beetle attack.

SAWMILL OPERATIONS

Fourteen Indian sawmills were operated during the year. These sawmills gave employment and training to a large number of Indians. Much of the lumber produced was used in building homes and other improvements. The two largest units, the Menominee Indians Mills in Wisconsin and the Red Lake Indian Mills in Minnesota, are operated on a commercial basis for the benefit of the Indians, under specific authority from Congress. During the year, the Menominee Indian Mills manufactured 18,001,076 feet of lumber and shipped 14,898,571 feet. In addition, a large quantity of byproducts was sold. Over 6,000,000 feet of hemlock which had been killed by the hemlock borer was also salvaged and sold to pulp and paper companies. The lumber manufactured at the Red Lake Indian Mills during the year amounted to 7,151,490 feet and 4,136,013 feet was sold and delivered.

On May 6, 1938, the Interstate Commerce Commission, after hearings, authorized the abandonment of the Minneapolis, Red Lake and Manitoba Railroad. The loss of this railroad will seriously handicap the operations of the Red Lake Indian sawmill and the Red Lake Indian fisheries.

FIGHTING FOREST FIRES

Forest-fire control on Indian lands was effectively reorganized during the fiscal year under revised regulations embodied in the Hand Book of Fire Control for the Indian Service, which was approved May 22, 1937. The organization of fire-control work by regions and the delegation of increased authority to the regional foresters not only provides closer supervision over the fire-control organizations on the various reservations but furnishes the reservation personnel with technical assistance and direction during periods of high fire hazard. The efficiency of fire-control work has been materially increased through projects undertaken by the Civilian Conservation Corps—Indian Division. Many truck trails, lookout towers, and telephone

lines have been constructed. The communication system has been greatly strengthened through the intensive use of semiportable and portable short-wave radio sets.

Forest Fire Record, 1938

Number of forest fires.....	1, 085
Area burned over.....acres..	10, 950
Amount of damage.....	\$19, 659
Cost of suppression.....	\$47, 137
Average burn.....acres..	10
Damage per fire.....	\$18. 19
Cost of suppression per fire.....	\$43. 44

A QUESTION CONCERNING ADMINISTRATIVE COST

An analysis of the business aspect of forest and range management on Indian reservations shows an administrative cost that is extraordinarily low. The question is, however, raised as to whether this low administrative cost, which necessarily means a smaller, less effective administrative organization, is truly economical. The ratio of 1938's administrative cost of \$412,000 to 1938's gross revenues of \$2,596,387 from forestry and grazing is only 15.8 percent, and the administrative cost spread over the 46,000,000 acres under management reflects a cost per acre of less than nine-tenths of a cent. Such conservative administrative cost becomes overconservative when the question is regarded from the standpoint of the \$100,000,000 in property values involved and the danger of sustaining serious losses by reason of the failure to provide sufficient funds for adequate supervision and protection.

Judged by standards obtaining in other services of a similar nature, appropriations averaging less than nine-tenths of a cent per acre for all administrative purposes, including protection, are inadequate, and the ratio of cost to income of less than 16 percent is unreasonably low. For example, the Canadian Government for the administration of Crown forests authorizes the expenditure of 25 percent of the gross income. The act of August 28, 1937 (50 Stat. 874), provides 25 percent of the gross income for the administration of the "Revested Oregon & California Railroad and Reconveyed Coos Bay Wagon Road Grant Lands of the State of Oregon." The conservation of Indian forest and range resources justifies the expenditure of a larger amount of money than has heretofore been provided.

IRRIGATION'S PART IN INDIAN LIFE

With most of the Indian reservations in the arid or semi-arid region, irrigation is vital to Indian life. Certain southwest tribes have been appropriators of water from times of remote antiquity and were working extensive irrigated farms when found by the Spaniards during the middle of the sixteenth century. The Indian Service not only

greatly extended and improved these old irrigation systems, but has built new projects on practically every reservation throughout the western arid territory. These irrigated areas range from small subsistence gardens of a few acres to highly developed reclamation projects of 100,000 acres or more. Not all of the larger projects are confined to Indian-owned lands. Privately-owned areas contiguous to the reservations have been included in order to round out the projects.

The earliest irrigation construction work for the Indians was done by the Reclamation Service in 1902, and taken over by the Indian Service in 1909.

RECENT DROUGHT EXPANDS IRRIGATION ACTIVITIES

The severe and widespread drought of the past 5 or 6 years has not only accentuated the need of larger irrigation facilities in arid Western States, but also has created many demands for irrigation works in the Great Plains area, including principally the Dakotas, eastern Montana, and Minnesota. As a consequence of this demand, Indian Service irrigation activities have been extended to these areas and a number of subsistence gardens have been constructed and other water supply developments, principally for stock and domestic use, have been completed. The orderly expansion of Indian irrigation is essential to afford means and opportunities for self-support, as well as to preserve Indian water rights, which are increasingly being jeopardized as development of the country takes place.

SUBSISTENCE GARDENS PROVE SUCCESS

The community subsistence garden program which was started in 1935 with funds provided by the Public Works Administration and continued during subsequent years with funds regularly appropriated has proved highly successful. Further construction of these gardens during the past year has increased the number to 98. The C. C. C.—Indian Division has participated in practically all subsistence garden construction work. Crop returns from these developments during the calendar year of 1937 amounted to \$61,600. This represents a gross return of 32 percent on a total construction investment of \$191,284. More than 1,600 Indian families and three large Indian schools derive a large part of their subsistence requirements from these gardens.

IRRIGATED ACREAGE INCREASES

Indian irrigation reports show that there are approximately 1,200,000 acres of irrigable land within the present Indian irrigation projects, of which area 800,000 acres are under constructed works, and full irrigation facilities have been provided for approximately 550,000 acres. The area irrigated by Indians shows an increase of 17,000

acres over the previous year and an increase of 1,600 families devoting attention to farming operations. A tabulation showing comparative statistics on Indian Service irrigation projects for the past 4 calendar years follows:

Year	Acreage irrigated			
	By Indians	Indian land leased	White owned land	Total
1934.....	140, 788	108, 435	198, 088	447, 311
1935.....	147, 264	117, 178	197, 995	462, 437
1936.....	150, 940	130, 353	206, 702	487, 995
1937.....	168, 360	134, 689	220, 126	523, 175

Construction costs to date have amounted to approximately \$54,000,000 with an estimated additional amount to complete all projects of \$46,000,000. These amounts, with an estimated further sum of \$5,000,000 with which to assist in the subjugation of Indian lands, make a total average cost of less than \$100 per acre.

CONSTRUCTION PROGRAM

The construction and water development program was maintained at approximately the same level as during recent years. Work of considerable magnitude was done on 6 of the larger projects and continued construction of smaller works was carried on on 14 reservations. Additional subsistence gardens were constructed in Oklahoma, New Mexico, Arizona, Nevada, California, and North, and South Dakota. Water supply development for both stock and domestic use was continued in the Navajo, Hopi, Pueblo, and Papago areas in New Mexico and Arizona.

Appropriated and other funds available for construction, operation, and maintenance during the fiscal year amounted to \$4,121,995. Of this sum \$1,579,498 was appropriated for regular maintenance and operation and an amount of \$185,000 was left over from Public Works allotments. All construction appropriations were made reimbursable by the land benefited, although under the Leavitt Act of July 1, 1932 (47 Stat., 564), these charges are not collectible so long as the lands remain in Indian ownership. Annual operation and maintenance charges are collected from all white users and from all Indians financially able to make payments.

MAJOR PROJECTS

Of the major projects now being undertaken, that on the Colorado River Reservation in Arizona is the largest. This work contemplates the construction of an irrigation system to supply water from the Colorado River to 110,000 acres. Irrigation works will include a large

diversion dam across the river, together with appurtenances and a complete canal system. Plans and specifications were completed during the year and a contract for construction was awarded on June 28. Work on the other large projects consisted of the completion of the storage dam on the Owyhee River, Western Shoshone Reservation, Nev.; the completion of a storage reservoir and the commencement of a large pumping plant on the Flathead project, Montana; continuation of work on the Fort Peck, Mont., pumping plant; and preliminary work on the construction of a large storage dam on the Crow Reservation, Mont. Miscellaneous, but extensive, construction activities were continued on the Navajo and Pueblo Reservations in Arizona and New Mexico.

PARTICIPATION IN CONSTRUCTION COSTS WITH OTHER AGENCIES

With the purpose of obtaining additional water supplies for several Indian projects, the Indian Service is sharing in the cost of construction of four large storage dams. Three of these are being constructed by the Reclamation Service and will supply additional water as in the case of the Southern Ute Reservation in Utah, under the Pine River Dam; the Salt River Reservation under the Bartlett Dam in Arizona, and the Fort Belknap Reservation in Montana, under the Milk River Dam. A contract is being negotiated with the Montana State Water Conservation Board and the Tongue River Water Users Association to participate in the construction cost and receive storage right benefits from a storage dam now being constructed on the Tongue River in Montana. This will supply additional water for the Tongue River Reservation.

ECONOMIC SURVEY AND MISCELLANEOUS INVESTIGATIONS

An economic survey to investigate and adjust irrigation charges pursuant to an act of Congress has been in progress during the fiscal year. This investigation will cover all features affecting the economic status of irrigation projects so that definite recommendations can be made to Congress. The field work on this activity has been confined during the year to the Uintah Reservation in Utah and to the Fort Hall Agency in Idaho. Surveys and investigations have also been made looking to the protection of water rights on a number of reservations and projects including especially New Mexico Pueblos and Indian-owned land in Oklahoma. Investigations and studies were made on prospective irrigation projects and developments in Montana, Oklahoma and the Dakotas. A number of these investigations are being made in cooperation with other agencies both Federal and State.

MAKING A LIVING

When a white extension worker deals with white rural groups he can often get cooperation for a good program within 2 or 3 weeks. He is speaking to people who have his own ambitions and whose fundamental reactions to life, often, are his own. When he tries to make effective an equal plan for Indian people, it is another story.

Nearly 300 years of deeply rooted distrust, and an attitude toward life which does not regard the piling up of material means as a first consideration, or of bulwarks against the future as of major significance, make the extension worker's Indian task much more complicated. What he can do with a white group in 2 weeks may, for these reasons, take him a year, or even more, with an Indian group.

John Eagle Eyes, as he listens to an Indian Service worker talk of the profits of a certain type of agriculture or grazing, does not easily forget that his own grandfather gave 20 years of his life toward building up a farm only to be driven from that land by an Executive order. Centuries of a hunting life are in John Eagle Eyes' blood and being, influencing him always. His whole countryside and all its hunting and fishing once belonged to him and his people. These are now gone. A succession of new ways of living which were laid out for him never equalled what he once had, in his opinion; for him no incentives that he considered essential urged him to adopt our ways.

An increasingly important part of the Indian Service task, thus, is to work out with the Indian (who is predominantly rural and non-industrialized) his own plans, and to help him clearly see what he is really going after. What does he want in terms of his own Indian life? What are the best methods, for him, of effectively adapting himself to white man's civilization?

In 1938 this Office has 311 men and women trained and experienced in essential rural activities living in every corner of the Indian country. Their lives are devoted to helping the Indians help themselves, by example, leadership, and actual shoulder-to-shoulder working with them. These workers have various official capacities, but they do not limit themselves to the formal label of their jobs. They "pitch into" every phase of Indian life and make themselves useful in everything, literally, which helps the Indian more effectively to make his living.

It is worth mentioning, in passing, that Indian Service workers generally, whether they be administrators, teachers, doctors, or technical experts, have always found it necessary to step frequently outside their own specialties to lend a hand to some urgent human problem needing the aid of the nearest capable person.

Within the last few years, a whole new world of credit and finance has been opened to Indian people. Reimbursable loans are made possible to all Indians living under the Indian Reorganization Act. The decision as to whether an individual Indian or a group will be given

a chance to borrow money rests with the workers in the field. These loans must be discussed carefully with each individual or group, for the loan goes far beyond a mere financial transaction.

Our experience shows repeatedly that the social and economic pattern of Indian lives often depends upon the intelligent use of borrowed money and the obligation upon the Indian to repay it. With the use of credit now a reality to an increasing number of Indians, cooperative leadership on our part is increasingly superseding the old-time dominations and those who urgently tried to sell a white man's idea for a nonwhite environment. Cooperative work in the Indian Service is essential now, toward effective help for the Indian in terms that mean something to him.

When we translate these various social forces into measurable reality, the following facts of last fiscal year's activity show some concrete and hopeful results. This is particularly true if the objective data here given is viewed in terms of what has just been said.

Livestock

Cattle:	1936	1937
Number of Indians owning cattle.....	21, 635	21, 287
Number of head of live animals sold.....	48, 133	69, 388
Pounds of dressed meat sold.....	616, 088	704, 639
Total income from cattle.....	\$1, 251, 371	\$2, 190, 620
Sheep and goats:		
Number of sheep units.....	942, 177	960, 725
Receipts from wool and mohair.....	\$614, 516	\$792, 556
Total income from sheep and goats.....	\$1, 142, 118	\$1, 519, 251
Other livestock:		
Number of horses, mules, burros sold.....		5, 311
Number of Indians owning horses, mules, and burros.....		28, 610
Number of horses, mules, burros owned.....		134, 905
Poultry:		
Number of birds owned by Indians.....		362, 732
Number of Indians owning poultry.....		15, 176
Cooperative livestock associations:		
Number of associations.....	119	124
Total membership.....	4, 476	5, 047
Number of cattle owned.....	123, 061	127, 275

INDIANS GRADUALLY RETURNING TO FARM ECONOMY

It has been encouraging to see a slow steady increase of Indians returning to their farms. The following facts show the trend:

	1936	1937
Number of acres cultivated.....	514, 529	544, 893
Acreage planted to cereal crops.....	244, 135	245, 330
Yields in bushels from cereal crops.....	2, 091, 360	3, 681, 731
Yields in tons from forage crops.....	198, 074	278, 841
Acreage planted in cotton.....	16, 682	17, 508
Yield in bales from cotton crops.....	3, 470	6, 026
Acreage planted in sugar beets.....	191	265
Yield in tons from sugar beets.....	2, 077	4, 077

INDIAN BOYS AND GIRLS AT WORK

The following table gives the facts relative to 4-H Club work:

	1936	1937
Total project enrollment.....	5, 758	6, 853
Total projects completed.....	4, 222	4, 936
Number of different members enrolled.....	3, 881	5, 156
Number of different members completing projects.....	2, 740	3, 512
Percentage of completions.....	73. 3	72. 17
Number of clubs.....	328	387

MODERN PRACTICES IN INDIAN HOMES

A growing number of the most intelligent women workers we can find are going into the Indian homes and working with Indian women. These workers are invariably trained in home economics and, much more important, they are trained in those things essential to happy, well conducted homes. If it is not easy for the average white wife, who is probably a high school graduate and who has lived in the very midst of white civilization, to run a home efficiently without some training, it is certainly no easier for Indian women.

During the year 1937 there was a total of 10,871 meetings held by Indian Service home economics workers with Indian women, on canning, drying, clothing, home improvement, nutrition, child care and recreation. Objective progress over the previous year is shown in the following figures:

	1936	1937
Number of quarts of fruits, vegetables, and meats canned.....	765, 051	1, 898, 579
Number of pieces of clothing made under auspices of home extension groups.....	142, 710	182, 415

SUMMARY

Helping the Indian help himself, therefore, has become the aim of all Indian Service work. It is pleasant to talk of spiritual development, moral awakening, and educational growth, but unless the Indian has enough to eat and enough to take care of the normal, decent clothing and shelter needs of himself and his family, he has little heart or spirit, or even strength, to give to other things. There is no more significant and essential task confronting the Indian Service than helping the Indian get on his own feet. After this, other things follow as they already are following.

**CONSERVATION WORK REBUILDS INDIAN LANDS;
GIVES WORK RELIEF**

Conservation work on Indian lands, as carried out by the Civilian Conservation Corps—Indian Division, is entering its fifth year. C. C. C.—I. D. work, during the recent years of drought and depression, has been almost the backbone of life itself. More than a source

of relief, however, the program has brought far-reaching improvements to Indian forests, ranges, and farm lands. The cumulative effect has meant better distribution of stock on Indian ranges; the opening up, through urgently needed water development, of additional range; better forage through fencing and reseeding; fire protection truck trails, fire breaks, fire towers, and telephones; checking of erosion through check-dams; and the elimination of pests.

Since able-bodied Indians, irrespective of age, can be employed, the work has been widely spread. The average daily number of employed enrollees during the year was 6,907. Employment had to be rotated at some agencies, so that approximately 9,500 participated in the program during the year. Although curtailment of the program meant a reduced personnel overhead, Indian preference in supervising and facilitating positions continued wherever possible. Four hundred and thirty-eight Indians held such positions during the year as against 344 whites.

TRAINING PROGRAM FOR ENROLLEES

During the past year, the C. C. C.-I. D. has emphasized instruction and welfare for its enrollees. The programs, which are carefully integrated with other Indian Service work, have varied according to local needs. Supervising employees have given generous voluntary support and time to the instruction program, which includes physical training and sports, individual counsel, placement work, training in personal health and hygiene, and training in various vocational and cultural subjects.

SAFETY PROGRAMS CUT ACCIDENT RATE

Our C. C. C.-I. D. death-from-injuries rate was cut almost in half during the past year—from 11 in 1937 to 6 in 1938. This may be laid, in part, at least, to the safety program, which has included weekly meetings, frequent inspection of projects, men, and equipment, and the sustained emphasis upon first-aid and aquatic safety instruction. Proper handling of automotive equipment, hand-tools, and explosives, has been insisted upon. All supervisory and facilitating personnel, as well as leaders, assistant leaders, truck drivers, and machine operators, are required to work for Red Cross standard first-aid certificates. Over half already hold these certificates and the others are working toward them. Some 25 percent of the enrollees have also passed the Red Cross examinations for certificates.

1938 Production Accomplishments
Civilian Conservation Corps—Indian Division

Telephone lines.....	miles..	668
Fire breaks.....	do..	95
Truck trails.....	do..	733
Horse trails.....	do..	237
Fences.....	do..	860
Springs, small reservoirs, and well development.....	units..	552
Impounding and large diversion dams.....	do..	142
Insect and tree pest control.....	acres..	66, 661
Erosion control check dams:		
Permanent.....	units..	3, 003
Temporary.....	do..	397
Vehicle bridges.....	do..	56

INDIAN INCOME

Popular ideas concerning the economic condition of the Indians vary widely. Those who have come into contact with the few Oklahoma Indians who struck it rich in oil, fancy the Indian as an opulent nabob. Those who have seen some of the homeless Crees and Chippewas picking over the refuse in the alleys of some Minnesota town picture the Indian as a starving waif. As usual, the truth lies somewhere in between; though much nearer the lower extreme than the upper.

The average Indian family lives above, but not far above, the minimum of subsistence. Cases of wealth are few; instances of critical poverty are many.

During the past year an effort was made to obtain more reliable and comprehensive information concerning Indian economic life. Estimates of the aggregate income of Indians living on reservations for the calendar year 1937 were requested from agency superintendents. From a preliminary tabulation of the data contained in these income statements which were received from 52 agencies, representing 131 reservations and approximately 162,000 Indians, a sample was obtained sufficiently large and geographically so distributed as to give a fair cross-section of Indian income and wealth.

The average Indian family of four persons enjoyed an estimated income for the year 1937 of approximately \$600. This figure comprises earned income and unearned income. It includes nonmoney income, as well as money income.

Thus, the average Indian family belongs very definitely in the lower third of the American population, as divided by size of income. Of the 131 groups reported on, only 15 (some very small) showed estimated incomes of more than \$1,000 per family; only 4 were in that estimated tenth of the population receiving family incomes of \$2,500 or more; and only in 3 groups, the Five Civilized Tribes, Osages and Quapaws, was there a considerable number of families in that magic 2 percent of the citizenry receiving family incomes of \$5,000 or more a year.

Of the total income received by Indians, approximately two-thirds was individually earned by the Indians themselves. Relief, both work relief and direct relief, made up a dismayingly large percentage of the income of many groups.

A valuable test of Indian economic progress lies in the year-by-year measurement of income, particularly the income earned by Indians through their own efforts at self-support. The Indian Office plans, therefore, to continue collecting and interpreting income data and to expand the scope of its statistical inquiries into Indian economic life.

INDIAN REHABILITATION

Thanks to the continued provision of emergency funds, the Indian Service was able to go forward with its attack on one of the major problems of Indian welfare—the lack of housing which meets even minimum standards of health and comfort, and the lack, general throughout the Indian country, of physical facilities for the conduct of community enterprises.

Housing, or the lack of it, carries, among the Indian population, an economic as well as social implication. Without a decent dwelling, without essential auxiliary farm buildings, the Indian family cannot live on and use its one principal resource—the land. The result, an inevitable drift to the vicinity of the agency with its work relief, rations, and fuel; the gradual springing up, near the agency, of a pauper's village of tents and shacks.

Help was extended the Indians, early in 1936, by an allocation of Emergency Relief funds for the initiation of a program of Indian rehabilitation.

Concentrating on the construction and repair of houses, farm buildings, and community buildings, and the financing of self-help enterprises, this program has had a triple aim: To provide some of the neediest Indians with houses and necessary farm and community buildings; to restore the Indians to the land and to a self-sustaining level; and, with the achievement of these first goals, to relieve the Federal Government, by that much, of the burden of caring for helplessly destitute, hopelessly dependent Indian wards.

Early in the fiscal year of 1938, the sum of \$1,055,000 was made available to the Office of Indian Affairs for the continuation of this rehabilitation program. The new allocation was made from funds provided by the Emergency Relief Appropriation Act of 1937, by means of transfer from the Farm Security Administration.

In the operation of the rehabilitation program, Indians have shown themselves eager to use every chance for self-improvement. They have seen in this work an opportunity, through their own efforts, to make fuller use of their resources. For example:





PROGRESS IN INDIAN HOUSING. BEFORE AND AFTER AT YAKIMA, WASH.

A REVITALIZED INDIAN COMMUNITY

In 1936, when rehabilitation funds were made available to the Office of Indian Affairs, it was determined to establish a small community on the Rosebud Reservation in South Dakota for the purpose of providing homes and an opportunity for self-support for a limited number of young Indian families with children, for whom no land was otherwise available. The families selected had been living with their parents under crowded conditions in inadequate homes, and there seemed to be no other opportunity for them to establish themselves as separate family units.

The Grass Mountain community is situated on the Little White River. Some 600 acres of fertile land located on the river were available. Fourteen acres were devoted to irrigated gardening. A stand of timber furnishes the community with fuel. There are also from 250 to 350 acres of range land which, added to adjacent grazing land which may be rented, will permit the community to develop a livestock herd.

From its start in the early part of 1937, into and through the past year, the Grass Mountain community has made progress. The community has utilized the opportunities provided under the Reorganization Act by organizing under the name of the Grass Mountain Development Association; and has borrowed from the Revolving Credit Fund the sum of \$3,500. With this money it has purchased three teams of mares, wagons, hay-making machinery, chickens, and milk cows, and will later lease additional grazing land.

Under the rehabilitation program facilities were installed for 12 families, consisting of a house, poultry house, and toilet for each family; three community wells were drilled; a canning kitchen and root cellar were constructed. During the first year in which the community was in operation, foodstuffs produced in the irrigated gardens and preserved in the canning kitchen totaled 6,050 cans of various vegetables.

Delegations of Indians from various parts of the Rosebud Agency and from other agencies in adjoining States have visited the new community. So impressed have they been with the success of this group and the improvement in their morale and physical well-being that a number of them have applied for an opportunity to develop similar communities.

Indians at several jurisdictions, due to improvements installed under the rehabilitation program, have announced that they are now in a position to provide food supplies, and in some cases clothing, for their own aged and indigent members. At other agency jurisdictions, because of rehabilitation work done, the superintendents have advised the Washington office that no further rehabilitation work is required.

Rehabilitation work during 1938 was conducted at 28 agencies situated in 18 States. The projects undertaken with the funds allocated during the past fiscal year were reduced in number in an attempt to concentrate this necessary work at fewer agencies, in order that more substantial results might be accomplished. During this year, employment reports showed as many as 1,986 needy Indians at one time being given work in carrying out the program.

Rehabilitation Projects in Progress, 1938

Individual units:		Community improvements—	
Houses, new	359	Continued	
repaired	965	Root cellars	1
Water development	469	Shop buildings	4
Toilets	573	Implement sheds	6
Barns, new	78	Grist mill	1
repaired	106	Flour mill	1
Poultry houses	139	Self-help laundries	2
Hog houses	30	Combination slaughter and	
Cattle sheds	50	smoke house	1
Root cellars	140	Livestock pens and exhibit	
Gardens	265	hall	1
Fencing units	60	Stock watering units	2
Kitchen ranges	28	Dipping vats (6 new; 10 re-	
Community improvements:		paired)	16
Self-help project buildings,		Buck herds purchased	3
new	30	Canning and sewing projects	100
repaired	14	Arts and crafts projects	3
Equipment for self-help build-		Sawmills	4
ings, new	8	Storehouses and tanneries	2
repaired	21	Land improvement	30
Outbuildings (3 barns; 1		Gardens and hot beds	25
poultry)	4	Agricultural equipment	17

ROADS FOR INDIAN NEEDS

Living upon reservations and, generally, in remote, sparsely populated sections, Indians have no need for the class A super-highways of our crowded cities. Indian Service roads thus are deliberately built to give the greatest number of usable miles per dollar while observing technical standards of safety, and economy in construction, and future maintenance.

For the last fiscal year the Congress appropriated \$3,000,000 for Indian roads. The money was used as follows:

Roads:		
Improved	miles	620. 25
Surfaced	do	476. 87
Maintained and repaired	do	5, 811. 43
Bridges:		
Constructed		94
Repaired		357

Culverts:

Constructed and installed.....	1, 740
Maintained and repaired.....	1, 071
Total number of people employed on road work during year.....	7, 954
Total man-hours of work furnished during the year.....	3, 064, 977
Average earnings per hour.....	\$0. 46

Two factors are especially important in considering the Indian Service road program. One is that roads must specifically further the economic and social development of the reservation life and culture; Indians must be able to move reasonably freely from their homes to the day schools, hospital and health centers, marketing, and agency communities. Secondly, Indian roads must give a maximum amount of work to employable Indian people.

Since the Indian is not exempt from the payment of gasoline tax, which is the source of revenue of most of our roads, he is entitled to have his road needs fully considered and acted upon.

Superintendents of Indian reservations have conservatively estimated that during the next 5 years, 6,872 miles of construction and improvements are needed to help the Indian reasonably effectively utilize and develop his land and resources. If this program were realized it would call for an expenditure of approximately \$7,000,000 annually. Increasing amounts of the road appropriation must go each year to the maintenance and the preservation of roads already built since it is cheaper by far to maintain roads than to rebuild them.

As provided by law, the Bureau of Public Roads continues to approve the location, type, and design of Indian Service road construction and the relationship of this recognized road-building agency of the Government, with the Indian Service, has been very friendly and cooperative.

ARTS AND CRAFTS AS SOURCE OF INCOME

The vitality and integrity of Indian arts and crafts still persist. Evidence is the fact that many of the Indians' finest creations are still made for ceremonial and personal use. From the point of view of income to the Indian, however, Indian arts and crafts have suffered from several handicaps: limited markets, lack of standards, demand for low-priced, rather than quality goods; and lack of concerted effort to establish public interest in superior and authentic products. Primarily to increase income to the Indians from the sale of their arts and crafts products, the Indian Arts and Crafts Board was established 2 years ago, with a modest appropriation. Since the Board's inception, standards of genuineness and quality for various arts and crafts products have been put into effect and the search for new markets has been vigorously pushed.

It is the Board's policy in developing markets for Indian goods to stimulate, guide, and protect that work now being done by Indians

which satisfies the needs of the present market; further, to stimulate supplementary production of superior merchandise for the discriminating market. This course it is felt will establish a reputation of fine craftsmanship for Indian goods and will give the best artists an opportunity to exploit their abilities.

In furtherance of this policy, the Board is endeavoring to help the Indian producer and the trader to present Indian wares in an attractive manner, and to participate in various Indian exhibits featuring the use of Indian craft objects in modern settings.

Various specific projects have been initiated by the Board during the past year. These have included a system for the marking—to prove authenticity and quality—of Navajo, Hopi, and Pueblo silver, and of Navajo textiles; the development of a home spinning industry in eastern Oklahoma, with an organization of 75 spinners (all of whose output has been marketed); and the formation of arts and crafts groups on three South Dakota reservations, which have been developed with the aid of a Board staff member. Survey work looking toward improved production of Indian arts and crafts has been carried on in North Dakota; in Alaska—where superb crafts objects are still being made; and in eastern Cherokee, North Carolina, where the short-season tourist market for basketry, woodwork, and pottery needs expansion. In cooperation with private persons, an arts and crafts project is being developed at DeSmet, Idaho, and improvement in the quality of goods produced has already become evident.

EXHIBITS AND EXPOSITIONS

Exhibits and expositions offer a powerful instrument of public education in the beauty and usefulness of Indian arts and crafts products. Board staff members have spent considerable time in the gathering of vivid, authentic exhibits for three expositions which, at the close of the fiscal year, were still in the future: The Intertribal Ceremonial at Gallup, N. Mex., in August, where, for the first time, the importance of display in the sale of Indian goods was to be stressed, and the theme of the usefulness of Pueblo arts and crafts in the modern home was to be demonstrated; the American Indian Exposition in Tulsa, Okla., scheduled for October; and the Golden Gate International Exposition to be held in San Francisco in 1939. This last-mentioned exhibition will be of especial importance in furthering interest in the Indian cultural heritage and in Indian crafts.

The Indian Arts and Crafts Board does not wish to delude the public, the Indians, or itself into assuming that increased arts and crafts production is the answer to the Indians' economic problems. The number of Indians interested in, and capable of, superior arts and crafts work cannot be indefinitely expanded; and there is a limit also to the amount of the goods which the market can absorb. But this

much is certainly true: that the top limit has not nearly been reached; and in reaching it, a number of Indians can support themselves in crafts work, and a much larger number, especially of women, can augment their incomes from this source.

ENFORCING LAW AND ORDER

Upon Indian Service and the organized Indians falls the grave responsibility of law and order on Indian reservations and on Indian restricted land. Also primarily an Indian Service responsibility is the enforcement of statutes against the sale of intoxicating liquor to Indians.

Liquor and its control continues the major problem in the field of enforcement among the Indians. From Indian groups have come requests for a modification of the present statutory prohibition against the sale of alcoholic liquor to Indians. Noteworthy among these requests during the past fiscal year were those from the Klamath Tribe of Oregon and from the Flathead Indians of Montana. Bills were introduced in Congress to repeal the statutes which prohibit the sale and possession of liquor on Indian reservations insofar as they apply to and affect the reservations of these two tribes. The Indian Office and the Department gave pronouncement to a policy decision of major importance in sending to Congress a favorable report on the Klamath repeal bill. Recommending certain amendments designed to place the major responsibility upon the Indians themselves and to establish a system of control by permit and license, the report stated plainly a belief that the present prohibitory laws applying to Indians are quite unenforceable on many Indian reservations, which are mere islands within the surrounding white life. It was explained that on some of the closed reservations the Indian liquor laws may be enforceable, but that on others where Indian lands are scattered among white holdings and where Indian traditions and Indian blood have been diluted by contact with the whites, a vigorous public opinion, hostile to the liquor laws, has developed among the Indians and a resentment has grown up against what the Indians hold to be a discrimination against them and a stigma of inferiority. Neither the Klamath bill nor the Flathead bill made progress in Congress, but it is felt that a sign post has been set up pointing the way, it is to be hoped, toward a statutory formula which will bring about a realistic handling and an effective control of the liquor traffic among the Indian population.

The law and order problem is the combined one of education, of development of Indian responsibility, and of enforcement of the law. Indians in general are as law-abiding as their white neighbors. As has been pointed out, most of the serious crimes committed by Indians have intoxicating liquor as a contributing cause. No small part of

the Indian Service law enforcement problem lies in the failure of many whites to recognize the validity of the Indians' property and personal rights.

Except for the 10 major offenses of murder, manslaughter, rape, incest, assault with intent to kill, assault with a dangerous weapon, arson, burglary, robbery, and larceny, Indian law and order cases are tried in tribal courts by Indian judges. A number of tribes, by authority of the tribal constitutions adopted under the Indian Reorganization Act, or as one of their inherent powers, have written their own law and order codes. Until they have adopted their own codes, tribes are subject to the general law and order regulations of the Department. A tribe may substitute its own code, subject to departmental approval, for the general code. These codes are, in their own areas, the law of the land.

The division of authority between State areas and Indian areas has in some places, especially on reservations broken up by allotment, created problems of jurisdiction; these are gradually, however, being clarified. The Indian tribes of one State have definitely recommended that they and their reservations be made subject to the State criminal laws and the State courts.

The adoption of tribal law and order codes brings to the fore the problem of training Indian police officers and judges. In this problem, the Indians must have, and are receiving, help from the Indian Service. Continued effort, both by Indians and by the Service, is essential in obtaining capable and well-informed Indian personnel and successful handling of this phase of self-government.

Prevention of delinquency, so inevitably bound up with economic factors, is ever-present in our thinking, and needs more attention in Indian Service law-enforcement work. So meager are our funds for law enforcement work, however, that in general only the prosecution of violations, rather than their prevention, can be undertaken by the law-enforcement division. Preventive work is being done on a number of reservations in the schools and the agency forces.

Thirty special officers and deputy special officers were employed during the past fiscal year; others were deputed as special officers in connection with their own regular duties; there were 198 Indian policemen and 67 Indian judges. Fines were collected in the amount of more than \$31,000; 2,313 criminal cases were instituted by regular Indian Service officers, of which 90.34 percent resulted in convictions. A large proportion of these were not offenses by Indians, but by whites, against the property and personal rights of Indians. Cases involving the sale of intoxicating liquor by whites to Indians were, as usual, numerous. Several thousand gallons of intoxicating liquors were seized, and 7,000 pounds of marihuana.

INDIANS AND SOCIAL SECURITY

The Indian, like everybody else, grows old and helpless. The Indian, too, deserves at least a degree of economic security in his old age.

In even the short time it has been available, the public assistance of the Social Security Act has been an important help to the Indian. It has helped, first and fundamentally, in meeting the Indian's actual, and often acute, subsistence needs. Secondarily, the collateral case work of State and county public welfare departments has helped the Indian to make many necessary adjustments.

There have been difficulties due to the status of Indian property as well as to the status of the Indian himself. Tax-exempt Indian land has created a problem in those communities where the public assistance programs are financed partly from county funds which, in turn, are based on property taxes. Several States have solved the problem by using State funds to pay both the State's and county's share of assistance to Indians.

A certain amount of delay in certifying eligible Indians to the program has been due to a confusion which Miss Sue M. White, attorney in the General Counsel's office of the Social Security Board, deploras as "an erroneous generalization that Indians already receive help from the Federal Government."

In her study, *Indians in Social Security*, Miss White traces this to "an honest misunderstanding of the extent to which the Indian Service has been enabled to grant direct relief from appropriations greatly inadequate for the purpose." She further points out that the administrative agents of Federal-State assistance are, in increasing numbers, beginning to look specifically at the facts in each case, rather than to accept "a mere general impression that all Indians are adequately provided for out of some special appropriation separate and apart from the general Social Security program."

The Indian's status as a ward of the Government is sometimes misinterpreted as grounds for ineligibility for benefits. The absence of individualism of Indian family life is another barrier to effective local administration of the program.

EXTENT OF PARTICIPATION

In spite of these difficulties, progress is being made.

At the present time, throughout the United States and Alaska Indians are participating in the public assistance program.

In a survey of October 15, 1937, the Superintendents of the Indian agencies reported that 6,451 Indians were being helped by Social Security. Today, the actual figures are considerably higher than these because, since the above computation was made, participation

has materially increased; and many Indians, not affiliated with any agency and, therefore, not included in the report, are receiving public assistance under the Social Security Act.

In certain of the States, Indian children are sharing extensively in specific State social services—maternal and child health, work for crippled children, child welfare, vocational rehabilitation—sponsored by the Children's Bureau, and the Office of Education, but administered (title V, Social Security Act) by the States.

In all this work the Indian Service personnel act as the liaison between the individual Indian who asks assistance and the county and State public welfare departments who administer assistance through the Social Security program.

The goal proper and possible, is that the Social Security Act shall operate as fully for the needy Indian citizen as for any other needy citizen.

INDIAN HEALTH

Through hospital and sanatorium service, nursing work, immunization programs, clinical work and health education, the Indian Service is working to better the Indians' health. In areas where other service is not available, which means most Indian areas, the Indian Service does this work itself. In a few areas where Indians live scattered among whites, the Indian Service has worked out cooperative arrangements with States and counties for health service.

The Indian Service during the past year maintained 79 general hospitals with 2,968 beds and 362 bassinets, and 14 sanatoria with 1,342 beds. A total of about 1,850 health workers were employed.

TUBERCULOSIS STILL GREATEST INDIAN SCOURGE

Tuberculosis continues to be the most dangerous enemy to Indian life. There are, however, heartening indications that a natural immunity is gradually developing among the Indian people. Reports from the Phipps Institute in Philadelphia, where many thousands of X-ray films are read and interpreted, apparently point to the fact that a number of cases of tuberculosis have resulted in natural cures without the patients' having known of their tuberculous condition.

An apparent increase of tuberculosis on certain reservations can be traced to the greater effectiveness of surveys. For example, a survey completed on the Pine Ridge Reservation where 17 percent of 3,700 Indians examined showed some type of chest lesion, resulted in the classification as tuberculous of 60 Indians who were subsequently sent to the new Sioux Sanatorium at Rapid City.

The tuberculosis vaccination program is making progress. The vaccinated and control groups are being followed up and illnesses are being checked. To date, 1,559 children have been vaccinated and an

equal number of controls are being watched. This work is now in progress at the following agencies: Pima, Ariz.; Wind River, Wyo.; Rosebud, S. Dak.; and Turtle Mountain, N. Dak.; and among the Alaskan natives near Juneau.

INDIAN SERVICE PIONEERING IN TRACHOMA RESEARCH

The eye disease, trachoma, prevalent among Indians, has been a major field of Indian Service medical research during the past fiscal year.

What is believed to be the actual cause of trachoma, a filterable virus, has been demonstrated as the result of cooperative work by the Indian Office and Columbia University at the Trachoma School on the Fort Apache Reservation, Arizona. The important findings were reported before the Ophthalmological Section of the American Medical Association at San Francisco in June 1938. The conclusion was presented that "trachoma is a virus disease and that its epithelial cell inclusions consist of masses of virus embodied in a matrix consisting largely of glycogen."

Startling reports were received from doctors working on the Rosebud Reservation of apparent cures or arrestments of trachoma obtained by the oral administration of sulfanilamide. The reports stimulated intensive study of this treatment. Results so far have been encouraging. Experiments on baboons at the Fort Apache Research Center have resulted in rapid improvement. Findings were presented in the form of a progress report before the American Medical Association at its June meeting.

The year showed continued improvements among the children at the Fort Apache Trachoma School. Similarly encouraging results were obtained at the Indian School at Chemawa, Oreg., where emphasis is being placed on the care of the trachomatous child.

CONTAGIOUS DISEASES FOUGHT

Immunization programs against contagious disease were carried forward. There were reported 754 cases of chicken pox, 865 cases of measles, and 261 cases of whooping cough. These totaled less than during the previous year. Cases of influenza were somewhat more numerous, approximately 14,168. In no instance, however, did influenza become a serious epidemic. The number of small-pox cases reported was 24.

The Navajo Reservation was visited by several diseases in epidemic proportions. During the fall and winter, 45 cases of typhoid developed, with 9 deaths. The probable source of the disease was ditch water which was found to be heavily contaminated. The bacteriological laboratory of the George Washington University in Washington,

D. C., aided materially in combatting the epidemic by examining cultures and laboratory specimens which were sent to Washington by airplane, packed in dry ice. Typhoid vaccine was liberally supplied by the Army Medical School, Washington, D. C., and 2,880 Indians were inoculated.

Rabies (hydrophobia) among dogs appeared on the Navajo Reservation in January. Four Indians and eight whites were bitten; 11 of these persons were known to have been bitten by rabid animals. All persons bitten received the Pasteur treatment and none has developed the disease. In all, 26 dogs were killed on the reservation and others in whom the disease was suspected were impounded as a precautionary measure.

COOPERATION WITH STATES STRENGTHENED

The advent of the Social Security Act entailed a revision of existing cooperative programs with State health departments. In Minnesota, for example, the Indian Office took advantage of the appointment of one or more public health nurses in Cook, Lake, St. Louis, and Carlton Counties who worked under the supervision of a full-time health officer and a full-time nursing supervisor. The Indian Office added to the State budget the sum of \$2,400 which had heretofore been used to maintain one Indian Office nurse who had attempted to serve the many Indians in this large area. In return for this contribution, the county nurses now render service to whites and Indians alike.

Another service financed entirely by the Indian Office has been the establishment of a district unit under the Five Civilized Tribes, Muskogee, Okla. An Indian Service nurse has been made nursing supervisor of this area. The plan calls for a county nurse to be placed in each of the counties involved. It is hoped to develop this area as a teaching field for field nurses new to the Indian Service.

Closer cooperation has also developed with existing Federal nursing services in program development. There has been an increase of Civil Service transfers to the Indian Service from other Federal agencies. This has made it possible to fill some of the existing vacancies in both hospital and field positions.

During the year five additional Indian Service physicians were appointed, with the approval of the Secretary, as Deputy State Health Officers, bringing the Indian Office into very close relationship with State health organizations. The District Medical Directors are in constant contact and association with the State health authorities and have been of material assistance in bringing about these helpful cooperative relationships.

Cooperative relationships were continued with the Public Health Service and the De Lamar Institute of Public Health, Columbia

University, in the investigation of epidemic diarrheal disorders in the United Pueblos areas, where the infant death rate and morbidity rate for all ages, from dysentery, has been extremely high. It has been found that the Shiga bacillus is the agent chiefly responsible, although many persons have been found to be carriers of the amoeba histolytica. At public expense, during the winter insanitary privies were replaced by sanitary types. During the following summer, 1937, the total incidences of diarrheal disease were low and the carriers of infectious agents had declined. No such decline in incidence has taken place in areas in which only a portion of the population has been provided with sanitary arrangements for sewage disposal. It is the opinion of the investigators in this field that complete sanitation appears to provide effective protection and that partial sanitation is of little value. The results of these experiments, now that the diagnosis and treatment have been reported, should prove effective in the sanitation of Indian pueblos where this disease is prevalent.

ENGINEER CORPS AIDS IN SANITARY ENGINEERING PROBLEMS

The Engineer Corps of the Public Health Service continued to render outstanding service pertaining to sanitary engineering at the various field stations. In all, 71 agencies or institutions were visited and surveys made. Sixty-two conferences were held regarding sanitary conditions, 21 water treatment plans or reports were prepared, and 25 sewage treatment plans or reports prepared. In all, 49 Indian Service plans pertaining to sanitary engineering work were reviewed. This service has been of immeasurable help in the improvement of sanitary facilities at the various reservations.

DENTAL SERVICE

Dental treatment was given to 22,536 Indian patients by field dentists and to 4,779 patients by resident dentists; 48,708 treatments were given. Of special interest is the fact that the Navajo Tribal Council petitioned Congress to set aside \$5,000 of their tribal money for the development of a dental unit in the new hospital at Fort Defiance on the Navajo. This was done and the Indians expect to reimburse the tribal fund by the payment of dental fees.

NEW HOSPITALS OPENED

Three new hospitals were opened during the fiscal year: That at Warm Springs, Oreg., with 21 beds; the Sioux Sanatorium at Rapid City, with 112 beds; and the Navajo-Hopi Medical Center at Fort Defiance, Ariz., with 126 beds. The opening of the hospital at Fort Defiance was unusual in that representative Navajo medicine men participated, with healing chants, speeches, and offers of cooperation.

MEDICAL PERSONNEL

The medical personnel of the Indian Office at the close of the fiscal year included 10 administrative and supervisory physicians, a supervising dentist, 9 supervisory nurses, 159 whole-time and 96 part-time field physicians, a special expert in tuberculosis, 3 special physicians for tuberculosis, 12 special physicians for trachoma, 23 consultants, 15 whole-time and 11 part-time dentists, 111 field nurses, 441 hospital nurses, 16 nurses at large working with special physicians, 9 assistant medical technicians, and more than 900 other employees. These show an increase of about 200 over 1937, due in large part to the opening of new hospitals, with some additional employees to provide better service at existing facilities.

HEALTH WORK AMONG ALASKA NATIVES

The Indian Service is charged with the task of promoting health work among natives of Alaska. For this work, the Indian Service maintains a technical staff of 63 health workers, made up of a director, a dental supervisor, a supervisor of nurses, 10 full-time physicians, 6 part-time physicians, 30 field nurses, and 20 hospital nurses. In addition, there are subordinate hospital employees, most of whom are natives. The vast distances, the cold, and the poor economic conditions in many of the native villages complicate the problem.

The Service operates 7 hospitals in Alaska; and in addition makes use of 12 private hospitals on a contract basis. Two additional Government hospitals in Alaska also furnish hospitalization to natives, and two Indian Service hospitals in Washington accept Alaska natives as patients. Preliminary planning work has been completed on a new hospital at Bethel. Construction on the new hospital at Point Barrow is nearing completion; finishing materials are being sent up on the Indian Service steamer *North Star* during the summer, and the hospital will be completed by January 1, 1939.

Dental service is furnished under contract on a fee basis by 16 local dentists. Most of these men visit nearby native villages at intervals as well as provide dental service at their own offices. The dental supervisor does dental work in districts not reached by the contract dentists.

The survey of dental conditions and research work among Eskimos in the Kuskokwim River region carried on in past years by Dr. L. M. Waugh of Columbia University and the Indian Service was resumed during the closing months of 1938 by Dr. Donald Waugh. The dental supervisor has been taking an active part in this work.

FIGHTING TUBERCULOSIS IN ALASKA

Tuberculosis continues to ravage Alaskan natives, whose death rate from this disease is about 10 times that for the United States as a whole. Since the number of sanatorium beds available in Alaska, 32, is insufficient to make any real impression on the situation, increased efforts have been made to locate the open cases and to teach the natives the importance of segregation of those infected, and particularly the importance of protecting young children. Living conditions of natives make for tremendous difficulties in dealing with the disease; educational work, however, is gradually showing some results.

At the two vocational schools, Wrangel and Eklutna, the plan for retaining early cases for treatment at school, inaugurated at the close of last year, was continued with excellent results. A number of children were kept at school under treatment during the summer with the result that most of them were able to return to school work in the fall.

The Territorial Health Department again has carried on the tuberculin testing and X-ray survey work which has included natives. Of 1,009 natives X-rayed and examined, 134 were diagnosed as positive for tuberculosis.

The vaccination program was inaugurated in southeastern Alaska, with the cooperation of the local health personnel. A total of 497 children were vaccinated with the Calmette vaccine and 447 were classified as controls.

COMMUNICABLE DISEASES

Among other communicable diseases, the continued occurrence of epidemic meningitis in the lower Kuskokwim region was striking. Strenuous work by Indian Service personnel curbed the spread of the disease. As the constant recurrence of isolated cases seems to indicate the presence of carriers, plans were made and work launched in cooperation with the Territorial Health Department for a careful survey and laboratory investigation of this problem.

Whooping cough reached serious proportions in the Cook Inlet and Kodiak areas; mumps was widespread, but not severe. No diphtheria or smallpox was reported, satisfying evidence of the efficacy of the vaccination program against smallpox and the immunization of children against diphtheria. Venereal diseases have been common in the larger towns, and are being treated vigorously. There are few cases in the remainder of the Territory.

FIELD NURSING SERVICE

Field nursing work must vary in accordance with local conditions; in general, however, we try to conduct a broad public health and educational program in addition to giving medical relief. Midwife training has been given special attention, and first-aid instruction with teachers and help in school health programs has been stressed.

COOPERATION OF OTHER AGENCIES

The United States Coast Guard has rendered invaluable aid in this scattered field, in transportation, and in actual health treatment work, including surgery. The Territorial Health Department has continued its close cooperation with the Indian Service, and the two organizations are carefully coordinating their programs.

Immunizations Against Contagious Disease During Fiscal Year 1937

	<i>Number of persons immunized</i>
Smallpox.....	11, 498
Typhoid.....	10, 609
Diphtheria.....	8, 384
Rocky Mountain fever.....	1, 146
Tetanus.....	224

INDIAN EDUCATION IN 1938

It is the task of the Indian Service to build upon the Indians' past, and upon the whites'. Both backgrounds have given richly to the world in material development, in spiritual forces, in creative expression of the arts. How to draw on the rich store of the past so that the Indians' lives today may be more satisfying and significant is the challenge thrown down to Indian Education.

It is not enough that we try to make the Indian self-sufficient so that, perhaps in our time, he may be economically on a par with the rural white man. The Indian has brought into our civilized life a philosophy of his own; an often under-rated sensitiveness to life, to nature, and to human beings; and a whole set of values not—like so many white concepts—based upon concern over his present needs or fear for the future. If there exists anywhere on earth a group of human beings attuned to nature, the Indians are that group. Yet here they are completely surrounded and in every possible way dominated by a civilization relatively new and in many ways alien. The staff of Indian Education, therefore, must never lose sight of the fact that what we give to Indian children as their basic formal education is all that they will ever receive. The Indian Service sets the boundaries. They, and the community, take the consequences.

Indian School Population and Enrollment During the Fiscal Year 1938

Total number of Indian children reported.....	¹ 86,747
Indian children 6 to 18.....	86,913
Total number enrolled 6 to 18.....	65,166
Public.....	² 33,645
Federal day.....	13,797
Federal reservation boarding.....	4,769
Federal nonreservation boarding.....	5,412
Mission, private, and State day.....	2,039
Mission, private, and State boarding.....	4,936
Sanatoria.....	433
Special schools.....	³ 135
Definite information not available.....	² 8,457
Not enrolled in any school.....	² 10,290
Eligible for enrollment.....	² 9,087
Not eligible for enrollment.....	1,291
Under 6 years and over 18 in all schools.....	2,834

¹ An apparent decrease in the number of Indian children this year from last year is accounted for by the fact that reports for the Five Civilized Tribes Agency, Oklahoma, cover only children having one-fourth or more Indian blood.

² It is estimated that 10,000 of these children are enrolled in public schools away from the reservation, in addition to the number known to be in public schools, making an estimated total of 43,645 in public schools.

³ Including colleges and universities.

Translating this into concrete reality for 1938 the following statements of fact may convey the picture.

VOCATIONAL EDUCATION STRESSED

Profiting wherever possible from the best practices in white public and private education, the Indian Service is developing a diversified school program aimed at the specific needs of each region in which Indians live.

The actual adjustment of Indians to white civilization varies greatly in different areas. Nowhere is it complete. Thousands of Indians, for example, do not speak English. Among the Navajo, for instance, it is estimated that more than 90 percent neither speak nor understand English. This, itself, creates special educational problems.

Land use is another challenging problem. Until faced with the ravages of soil erosion, due largely to overgrazing, the Navajos were self-supporting and self-sufficient. They perpetuated their ancient culture with a minimum of adjustment to neighboring whites. Today, education is a powerful force in helping these people bring back their land to its former productivity. The alternative is slow starvation.

Assimilation has become a very real problem. In areas such as Minnesota, Washington, and California, where assimilation of Indians is proceeding rapidly, Indian children are taken care of in public schools. In recognition of the exemption of Indian lands from taxation, the

Federal Government pays the school districts for such services. During 1938 approximately \$1,045,000 was spent for Indian education in district schools and \$378,000 was paid to the States.

BOARDING SCHOOLS DECREASING

Indian boarding schools have decreased in number and day schools have greatly increased. Instead of breaking up Indian home life, the present policy is to preserve and strengthen home ties. In 10 years, the Indian day school population has risen from 4,532 to 14,087.

Vocational secondary education is provided for a steadily growing number of adolescent Indians. In the last 10 years the number of pupils enrolled in the tenth, eleventh, and twelfth grades has increased from 1,409 to 3,654.

By means of educational loans 546 Indian students were helped to go to colleges and vocational schools. By this means, more Indian young people are helped each year for positions of leadership in their own community.

Most of the Indian Service boarding school plants were either inherited from the Army, whose forts were often transformed into Indian schools, or were built in the 10 years from 1885 to 1895. The initial construction was often poor and the buildings unsuited to modern ideas of what constitutes a desirable structure for educational and group use. During the last 10 years a carefully planned reconstruction of the Indian school plants has been undertaken. Better dormitories have been developed. A cottage type of dormitory for smaller schools has been designed.

ADULT EDUCATION ADVANCES

Community programs have been an important part of the educational policy of the Indian Service for the last 10 years. A modern Indian day school contains, in addition to classrooms and living quarters for the staff, a kitchen for the preparation of a noon lunch and for cooking instructions for parents and children; a community room used by adults for a wide variety of purposes; a clinic for the use of the field nurse and traveling doctor; a laundry for community use in areas where domestic water is scarce; and shower baths and toilet facilities for use by pupils and adults.

In some instances adults who use the school facilities exceed in number the children in classrooms. Confidence in the schools on the part of the older Indians is on the increase. Improved practices in hygiene, in sanitation, and in soil conservation are being taught—and accepted by the Indians. Community discussions of tribal affairs, extension demonstrations, and similar activities are developing at a hopeful pace.

Vocational emphasis in education is increasing rapidly. For instance, the Oglala Community High School at Pine Ridge, S. Dak., is operating a beef herd of more than 800 head on a leased reserve of 30,000 acres. In Oklahoma, an 8,000-acre dry farm is being operated by the students of the Chilocco Agricultural School. These are but two of many instances of the way in which vocational education ties in with the actual life to which the student must return. Industrial shops training carpenters, auto mechanics, shoemakers, and similar artisans are scattered throughout the Indian country. Today the Indian Service operates 247 schools in the continental United States and 103 in Alaska. In all of these institutions the same practical objectives form a foundation.

The teaching staff in the Indian Service will stand comparison with that of any first-class American public school system. Gradually we are developing teaching materials fitted especially for Indian life. Since many Indian children live in areas remote from city life and possess citizenship relations to the State and national governments differing from those of white children, new and original material is needed. We hope within the coming year to publish the first of such materials.

This, then, is a picture of the actualities, the hopes, and the ideals which motivate the program of education for the Indian people.

REORGANIZATION AND SELF-GOVERNMENT ACTIVITIES

It is necessary to restate from time to time the historical processes underlying the administration of Indian affairs. It is necessary because repeatedly the question is raised as to why Indian lands should be tax-exempt, or why the United States should administer health, education, and other social services for the Indian population. In brief, why should the Indian be under guardianship?

WHY INDIANS' SPECIAL STATUS?

European colonizers and their descendants brought to America ideas of land ownership, morality, government, and religion which were meaningless to the native American. In time these ideas became dominant to the exclusion of Indian habits of thought. Since we were a humane Nation and were not bent on destroying the Indians, we assumed the responsibility of showing them how our ideas operated. We wanted them to learn our ways so that they could exist side by side with us. In other words, we instituted a system of Indian education which is with us today.

We took away from the Indian all but a tiny fraction of his wealth in land, water, and other resources, and even his food supply, insofar as that consisted of game and wild products; and by doing so we charged ourselves with the responsibility of keeping the Indian from

starvation. Furthermore, since the Indian's understanding of property differed from ours, it was obvious that he would not long retain the little property left him if he was not protected. That made it necessary to erect trust-barriers around him which would prevent predatory men from making off with the means by which the Indian was to be taught a new way of existing.

By placing trust-barriers around Indian property, we exempted his land from State and local taxation. In taking this action we were subjecting the Indian to possible discrimination on the part of the States which would have resulted in leaving him without health care, education, roads, or any of the services which a State renders its people. States and local communities cannot furnish services without revenue. Once again, then, it became necessary for the Federal Government to assume an obligation toward the Indian tribes whose property it was seeking to protect.

These are the factors which Congress and the courts have borne in mind when they have dealt with Indian questions. The historical process has been long and involved. A mass of rules and regulations has accumulated and is today operative in the Indian Service. It is not an inert mass, as so often is assumed. There are within it directional drives, the aim of which has always been to solve or to cure the fundamental dislocation of a people overwhelmed by a superior force.

We are now at work developing a policy which we believe to be broad enough and sound enough to achieve, if continued, the purpose for which the Indian Service has always worked—the Indian's adjustment to his new world and a termination of his "problem." That policy is based on two ideas—organization, and a fuller use of land. Out of organization will come greater participation in the management of property and domestic affairs; and out of land use, which contemplates the purchase of land for those now landless and credit to carry on operations, will come better living conditions. Fundamental to the program is a recognition of the right of Indian culture to survive and enrich the daily life of the individual and the group. Not humanitarianism alone, but a belief that human beings are at their best when they are left at peace in those matters of conscience which come closest to them, prompts this attitude.

Legislation was required to initiate the program, and in June 1934 the Indian Reorganization Act was written into the statute books. Four years have passed since then, with some notable results.

The Flathead Reservation: An Example

The Flathead Reservation in Montana, home of the Confederated Salish and Kootenai Tribes, was the first to be organized under a constitution and to be incorporated. It was a typical reservation of

the Northwest, where allotment had broken up an early start in stockraising, and later years had brought a gradual pauperization in resources and social stamina. Of the 1,250,000 acres belonging to the Indians in 1910 when allotments were made, no less than 750,000 of the best acres were lost within a period of 20 years. The stock business was smashed. One-half of the 1,400,000,000 feet of merchantable timber had been dissipated in unfruitful per capita payments. Drought and depression in late years left the 2,900 Indians exhausted and ambitionless.

The Reorganization Act saved to the reservation at one stroke a total of 192,425 acres of surplus land, land which had not been entered by homesteaders and which the Secretary of the Interior under the act was empowered to return to the tribe. This was not valuable land, but at the very least it will serve as a game refuge. The tribal council at Flathead is aware that land shortage is one of its most serious problems. The best agricultural acres have gone into white ownership and must be repurchased. The council is not willing to wait for the Government to purchase land with the funds made available by the Reorganization Act, but has already had introduced in Congress a bill which would permit the tribe to use for this purpose its own funds on deposit in the United States Treasury.

How successful Flathead has been in making use of the Reorganization Act is revealed in a single detail. Under its tribal constitution, the council has authority to meet its expenses out of available tribal funds. During the fiscal year 1938, acting under this constitutional authority, the tribal council submitted a budget calling for the expenditure of \$5,000 and requested the Secretary of the Interior to make available out of tribal funds the amount called for in the budget. The approval was given. At the end of the fiscal year a financial statement was rendered which shows that the tribal council spent a total of \$2,250.45; received as income during the year, \$7,134.21; and at the end of the fiscal period had a balance of \$4,883.76. It is almost universally believed that Indians are improvident with money and should not be called upon to handle money. This probably is one of the least excusable of the misconceptions which people have of the Indians.

Reading the minutes of the tribal council and of the credit committee which is administering the revolving loan fund of \$65,000, one is repeatedly struck by the good sense shown by council decisions and by the business-like manner in which the meetings are conducted. Flathead definitely is clearing a way out of its particular depression.

EIGHTY-TWO TRIBES ARE ORGANIZED

At the end of this fiscal year there were 82 tribes, with a population of 93,520 Indians, operating under constitutions and bylaws; and of these, 57 tribes, having a membership of 64,000 Indians, had

become incorporated under Federal charters. What this means can better be understood by explaining that these tribal constitutions contain specific grants of power, as follows: The right to negotiate with the Federal, State, and local governments, and to advise and to consult with the Interior Department on all activities which may affect the tribe; to approve or veto any sale, lease, or other disposition of tribal property which may be authorized or executed by the Secretary of the Interior or the Commissioner of Indian Affairs; to advise the Secretary of the Interior with regard to all appropriation estimates or Federal projects for the benefit of the tribe; to make assignments of tribal land to its members; to manage all economic affairs of the tribe, subject to the terms of a charter; to appropriate for public purposes any available tribal funds; to devise a system of taxation by which funds for tribal use may be obtained; to determine its own tribal membership; to protect and preserve wildlife and natural resources and to regulate the conduct of trade; to cultivate native arts and crafts and culture; to administer charity and to protect health and the general welfare of the tribe; to charter subordinate organizations for economic purposes; to regulate the domestic relations of its members; to regulate the procedure of its governing body. These are powers which the tribe may exercise without interference by any arm of the Federal Government.

Certain additional powers are subject to review or approval by the Secretary of the Interior, including the right to employ legal counsel, to exclude nonmembers from reservation lands, to govern the conduct of its own members and administer justice through a tribal court, to purchase for public purposes property under condemnation proceedings, and to regulate the inheritance of property other than individual allotments of land.

REVOLVING CREDIT FUND OPERATIONS

The Indian Reorganization Act, in recognition of the need of the Indians for credit, authorized the establishment of a revolving fund of \$10,000,000 for loans to Indian chartered corporations. The Oklahoma Indian Welfare Act extended the benefits of the revolving fund to Oklahoma Indians, and authorized an additional appropriation of \$2,000,000. The act of May 1, 1936, also extended the benefits of the revolving fund to Alaska. Of the amounts authorized, the following appropriations have been made:

	Total appropriation	Administrative expenses ¹
1939.....	\$400,000	\$120,500
1938.....	520,000	125,000
1937.....	980,000	65,000
1936.....	2,500,000	50,000
Total.....	4,400,000	360,500

¹ Amounts included in total appropriations.

Of the \$4,039,500 available for loans, the following advances and commitments to organized tribes all over the country had been made as of July 1: \$4,277,054.54 committed; \$1,861,605 advanced.

CHARTERED CORPORATIONS ACTIVE

Indian chartered corporations are proceeding wisely with their lending activities. Loans made to individual members have been principally for agricultural purposes. The main items purchased with the proceeds of loans have been livestock, machinery, and equipment. Although borrowers in some sections have had difficulty in making repayments due to drought conditions, on the whole the few repayments to the corporations which have so far fallen due have been made as scheduled. Loans are made to individuals only on the basis of sound plans; and unless climatic or other unforeseen factors interfere, repayments can usually be made from the proceeds of the financed enterprises.

A number of corporations are engaging in corporate enterprises, which are being conducted for the benefit of the members of the tribe as a whole.

THE NORTHERN CHEYENNES IN THE LIVESTOCK BUSINESS

The largest single undertaking is that of the Northern Cheyenne Tribe of the Tongue River Reservation, Mont., where a steer-feeding enterprise is being conducted. Grass is the biggest asset of this tribe, and livestock production is the only means of securing an income from this asset. The northern location of the reservation, and the scarcity of hay for winter feed, limit the number of cows and calves that can safely be carried on the range. Only about one-third of the range has been used by the Indians in the past, and the balance has been leased to white cattlemen.

Recognizing the desirability of utilizing its own assets to the utmost advantage, the corporation decided to enter upon a steer-feeding enterprise. Under the plan adopted, steers will be purchased each spring, run on the range two summers and one winter, and sold at the end of an 18-month period. Thus there will be twice as many steers on the range in the summer as in the winter. A total of 2,036 steers were purchased in the spring of 1937; they will be sold this fall. The steers were carried through the winter with a net loss of less than 2 percent. An additional 2,150 head were purchased this spring, and will be sold in the fall of 1939. It is planned to develop the enterprise so that within 10 years approximately 9,700 head will be carried on the range in the summer, and 4,800 head in the winter. Within 18 years, the corporation should be operating entirely with its own funds, since part of the profits are annually reinvested in the enterprise.

The Fort McDermitt, Nev.; Rocky Boy's, Mont.; and Fort Belknap, Mont., corporations, are all conducting corporate hay enterprises. Winter feed is also the limiting factor in the development of the livestock industry on these reservations. In recognition of this fact, the governing bodies of the corporations are attempting to meet the problem by raising and storing hay.

The Lac du Flambeau Indians are operating a tribal tourist cabin enterprise. The reservation is located in the heart of the tourist country of the Lakes States. At Jicarilla, N. Mex., the Indians are operating a tribal store.

Tribal corporations on the whole are taking a very business-like attitude toward credit in their consideration of applications. They seem fully to realize that credit offers an opportunity for the improvement of the economic status of their members, and that only by making sound loans which will be repaid can the purpose of the revolving fund be realized.

No loans have as yet been made in Alaska; one loan, for the operation of a salmon cannery, was under consideration at the close of the year.

CHARTER OPPORTUNITIES

The charter, as the term implies, is an instrument granting incorporation which permits a tribe to function as a business enterprise. Under its terms, which need not be repeated here, the tribes set forth the conditions under which they shall exercise their constitutional authority to manage their economic affairs.

One has only to review these powers to realize that immediate opportunities exist for a tribe to participate actively in the management of its resources and its domestic affairs. These opportunities entail responsibilities. The tribes must learn how to secure revenue, how to budget their funds, manage their land and other resources—in short, how to operate as a political entity and as a business venture. For a people who have had little experience in such matters, the task before them is formidable.

Striking as have been some of the achievements under the Indian Reorganization Act, its results are only at their commencement. In 50 years the current which would have destroyed Indian property and Indian culture had swollen to flood stage. It bore down and crushed all but those tribes which had escaped allotment. They alone—Menominee, Navajo, Duck Valley, the Pueblos, Papago, and a few others—stood like islands above the drowning waters. Floods cannot easily be checked or diverted; yet, we are attempting just that. The flood of 50 years of land losses is the problem we face.

The tribes themselves present problems of their own. Some are so poverty-stricken and so nearly dead in spirit that they only stand and

stare at our activity. Having no money on which to operate their government, the members of their governing bodies are likely to lose interest quickly or are carried off by jobs that pay them a living. The system of law and parliamentary procedure which the constitutions and charters contemplate in some cases is too much for a dispirited tribe to undertake. Organization field agents will continue to work with them and in time, we hope, will help them to find a way around their difficulties and will convey to them a sense of the opportunities which lie waiting for them. Follow-up work of this sort is vital to the whole program.

SOME IMPORTANT COOPERATIVE PROJECTS

Indian lands, and the use to which they are put, are never capable of being isolated. In a number of instances, Indian reservations constitute the predominant lands of critical watersheds. The comprehensive land-use programs of the Government need the participation of Indians, and have much to contribute to Indians.

Previous annual reports have recorded the development of cooperation between the Indian Service and other Federal agencies. The cooperation between the Soil Conservation Service and Indian Service in the Navajo, the Pueblo, and several other areas has gone forward successfully during the past year. The fact-finding and plan-making work of that division of Soil Conservation Service called Technical Cooperation, Bureau of Indian Affairs has been increasingly productive. The sheep genetics laboratory at Fort Wingate, N. Mex., a joint operation between the Indian Service and the Bureau of Animal Industry, continues its work. In the Rio Grande watershed, an Interdepartmental Rio Grande Board, whose creation was suggested by the Indian Service, now unites for common action three units of the Department of the Interior—the Indian Service, the Division of Grazing, and the Bureau of Reclamation, and four of the Department of Agriculture—the Soil Conservation Service, the Forest Service, the Farm Security Administration, and the Bureau of Agricultural Economics.

Seeking to develop programs of conservative land use among Indian tribes, the Indian Service and the cooperating agencies endeavor to subordinate technical programs viewed merely as such to Indian comprehension and the willing participation of Indians. Conserving Indian land is secondary to conserving Indian life; and using Indian land is secondary to using Indian native powers. In certain areas of Indian life, this policy has caused the land-use effort to move more slowly than would have been possible by the method of fiat. Even in these areas, the fable of the turtle and the hare will be illustrated if continuing patience and resourcefulness are supplied. In other areas,

of which the New Mexico Apache reservations and New Mexico Pueblos are prime examples, the way of working through and with the Indians has proved to be the swiftest way toward technical results both brilliant and lasting.

AREA PROJECTS

Second only in importance, in land-use programs, to the participation of the Indians themselves, is the participation of superintendents and their local staffs. And not only with respect to land-use programs, but equally with respect to health and school programs, and generally to the whole of Indian Service as realized within local areas, it is a matter of fixed policy that Indian jurisdictions, through joint action between the Indians, the local staffs, and the technical advisers from Washington, shall gradually forge out for themselves what are known as area projects, and that these area projects shall be the operating plans for the jurisdictions in question. To such area projects it becomes the business of the Washington office to accommodate its regulations and its overhead services. By this method, Indians gain confidence; the initiative and responsibility of the field personnel are increased; and stability of Indian policy, based upon realities local to the human areas of the Indians, is insured. Outstanding examples of the area project method, with its resultant establishment of a large degree of local autonomy within jurisdictions, are furnished by the Navajo and Pueblo administrations, the Five Civilized Tribes administration, and that of a number of organized tribes in diverse sections of the country.

Closely related to the policies and endeavors here set down are the rise of two interesting attempts by superintendents within large geographical areas to cooperate in the solution of their common problems. There has been formed a Southwestern Superintendents' Council, embracing all of the jurisdictions in New Mexico and Arizona, and a Northwestern Superintendents' Council, embracing all of the jurisdictions in Washington, Oregon, and Idaho. These councils, with approved constitutions and bylaws, with officers, and with meetings held at regular intervals, have brought to a focus many needs which, once defined, have been recognized as true needs with feasible solutions.

FINDING AND TESTING FUTURE ADMINISTRATORS

The Indian Service has moved swiftly from prescribed routines to experimental methods and local adaptations. The Indian Service administrator's task has become one of planning and leading; and it is a business operation of complexity and magnitude; it involves the manipulation of a considerable number of technical services, always with a view to their incorporation within local Indian life. Indian

administration calls for men and women with some creative endowment, much discipline, a capacity for suspended judgment joined with a capacity for taking action and for accepting the consequences of one's own initiative. It calls for an exceptional ability in dealing with superiors, with coordinate officers, and with subordinates. And finally, it calls for unusual endowments of efficient social and human nature; because an Indian Service which fails to enlist deeply the rank and file of the Indians, falls short in everything else, and enlistment must be of the heart as well as of the head.

Is it possible to identify in advance, through methods appropriate to the competitive civil service, those endowments, interests, psychological traits, personality characteristics, which give promise of a successful administrative career in Indian Service? Can past performance supply the evidences of such fitness or want of fitness in a candidate? How can the probationary period be so used as to reveal the presence or absence of essential traits, the having or not having of the power to overcome threatening weaknesses? What kind of pre-service or in-service training is needed, in order to meet this need which ultimately is the critical need in the Indian Service—the finding and developing of administrators?

In the main, the question must be asked not at the top administrative level, but at a level below the top one. The leading personnel problem of Indian Service is to find and equip subordinate or junior administrators, whose careers will be commenced in the local jurisdictions among the Indians.

ROCKEFELLER FOUNDATION GIVES GRANT FOR PERSONNEL EXPERIMENTATION

To try to find answers to the questions above set down, there has been established the Southwest Field Training School for Federal Service, administratively conducted under the Commissioner of Indian Affairs and the superintendent of the United Pueblos Agency. This activity is supported by a grant made by the Rockefeller Foundation through the Institute of Public Affairs, and the search for the men and women to be admitted to the experimental enterprise is a responsibility of the Institute of Public Affairs. Essential to the success of the experiment is the placement of the so-called field aides in positions of true responsibility, because in such situations alone can their vital abilities be finally tested. Essential, too, is the maintenance of performance records which shall supply an objective basis for competitive promotion; and the keeping and making of such records must not be confined to the members of the experimental institution, but should be extended to the regularly employed personnel as rapidly as knowledge is available and resources permit. A whole-time director of training, attached to the experiment at Albuquerque, not merely

works with and upon the so-called aides, but carries out job analyses within the United Pueblo and other jurisdictions, and it is his role to participate in the wider experimentation with records and with in-service training applied to the regularly employed personnel. The "aides" are not privileged persons in any sense of the word, but must meet, in qualifying for positions and in subsequent advancement, the tests of civil service and of the personnel system of the Interior Department and the Indian Office. The aides are given testing experiences also in other Federal services local to the experimental area.

Arising initially out of interest in the experiment above described, there has been created an Interdepartmental Committee on Problems of Personnel, made up of representatives of the Civil Service Commission and the Departments of Agriculture and Interior. This committee, whose functions are not administrative but advisory, and in the nature of research, deals with questions of personnel common to the agencies which make it up, and especially with those questions which lie upon that borderline where the Civil Service Commission and the executive organizations have their problems in common.

PERSONNEL ADMINISTRATION

The personnel work of the Indian Service continues to be one of the important elements upon which the success or failure of the carrying out of an Indian policy depends. Previous annual reports have referred to the extreme diversity in the types of personnel needed to carry out Indian administration.

The recruitment and training of persons for assignments to administrative posts continues to be of paramount importance. The drafting of civil service examinations designed to procure eligibles who are qualified to perform the various tasks required of them and who can make the necessary social adjustments to conditions under which persons at the various Indian Service field stations must live and work, has progressed with reasonable rapidity. Much work must still be done in this field, to insure a steady improvement in the quality of the service to be rendered by Indian Service personnel.

During the past year, the central personnel record system in the Indian Office has been completely overhauled and a modern visible system installed. Procedures in the handling of personnel work have been analyzed, and changes made which it is hoped will ultimately insure a more expeditious handling of personnel matters.

The method of evaluating quarters and other facilities furnished to employees of the Indian Service was very carefully analyzed, and a procedure guaranteeing a more equitable means of arriving at charges for such services has been worked out and placed into effect at approximately one-fourth of the field stations. It is hoped to complete this work within the year ahead. In service training schools, starting

in the Southwest, for the development of future administrators, are discussed elsewhere in this report.

On July 1, 1937, the beginning of the fiscal year, there were authorized in the Indian Field Service and Alaska 6,933 positions, carrying salaries in the amount of \$11,106,562. These figures include only permanent, year-round positions.

EMPLOYMENT OF INDIANS

From time to time, estimates have been made of Indians employed in the Indian Service but accurate statistics on this subject have not heretofore been available. As the result of a survey, in the course of which all Indians in the Indian Service were requested to fill out a questionnaire relating to their employment, it was found that as of April 30, 1938, there were 3,916 Indians employed in the Indian Service, of whom 3,627 were in regular, year-round positions. In other words, approximately one-half of the regular employees of the Indian Service are Indians. Slightly over 40 percent of the Indians employed proved to be full-bloods, and slightly more than 70 percent were of one-half or more degree Indian blood.

The Indian Service continued during the year to maintain a number of employment offices devoted to the aiding of Indians in securing employment. Some 4,000 Indians were placed in positions outside of the Indian Service as the result of the efforts of our employment service units. Of the 4,000 Indians placed in private employment during the year, some 2,500 went into permanent assignments. The demand for Indians for employment as household workers exceeds the available supply, and placements in this field have remained constant. There is also a continuing demand for technically trained and skilled Indian workers.

During the past year it was deemed advisable to discontinue the employment office at Gallup, and to establish an employment unit at Billings, Mont. Heretofore, no direct employment service for Indians has been available in the northern Great Plains area.

GOVERNMENT CONSTRUCTION

A total appropriation of \$2,047,500 was made available to the Indian Service for the construction and repair of buildings and utilities during the fiscal year 1938. A large part of the appropriation was used for making necessary repairs and improvements to water and sewer systems in the Northwest. The largest single item was for the construction of a hospital plant, including quarters for employees, at Crownpoint, N. Mex., on the Navajo Reservation.

During the fiscal year 1938, numerous projects financed from the Public Works appropriation were completed. Most important of these projects were the sanatorium and general hospital at Talihina,

Okla.; a hospital and laboratory at Fort Defiance, Ariz.; and the construction of units for the hospitalization of Indians at the Weimar and Wishiah sanatoriums in California.

For the fiscal year 1939, an appropriation of \$2,061,000 was made available in the regular act, and in addition the sum of \$5,313,000 has been allocated from the appropriation for the construction of public works.

Field construction offices are maintained at Albuquerque, N. Mex.; Billings, Mont.; and Muskogee, Okla.

INDIAN POPULATION

The statistics of the Indian population in the United States tell a significant story. Reports submitted by Indian Agencies under supervision of the Office of Indian Affairs show that while this vital race of people has more than held its own in numbers, it is gradually losing its racial identity and slowly but surely is blending with the surrounding population.

During the past 8 years, the number of Indians on current census rolls at Federal agencies has increased at the rate of approximately 1.2 percent per year. This compares with an average annual increase for the population at large, as estimated by the Bureau of the Census, of only 0.7 percent over the past 7 years.

But while the enrolled Indian population is on the increase, the number of full-blood Indians is decreasing in proportion to the total Indian population. In 1930, 64.5 percent of the Indians on census rolls were full-bloods. In 1937, the figures show that the percentage had dropped to 60.5. In other words, if the present trend continues, the day will come—except perhaps on certain reservations in the Southwest—when there will be few full-blood American Indians left.

The total Indian population under the jurisdiction of the Office of Indian Affairs, as of January 1, 1938, was 342,497. As of January 1, 1937, the number was 337,366, denoting an increase of 5,131. In addition to this Indian population, the Indian Office had under its jurisdiction the education and medical relief of approximately 30,000 natives of Alaska—a total responsibility, therefore, for the welfare of more than a third of a million Indians and Eskimo citizens.

Of the Indian population in continental United States, 96,723 Indians, or 28.2 percent, are in Oklahoma. Arizona follows with 46,255 Indians, or 13.5 percent; and then New Mexico with 36,078 Indians, or 10.5 percent. Thus, 179,056 Indians, or more than one-half (52.2 percent) of the total Indian population of the continental United States are found in these three States. (See Table Q.) Next in rank after these three States, in the number of Indians, are South Dakota, with 28,030, or 8.2 percent; and California, with 23,637, or 6.9 percent. If the number of Indians enrolled in the five States

of Montana (16,341, or 4.8 percent), Minnesota (15,906, or 4.7 percent), Washington (13,741, or 4.0 percent), Wisconsin (12,467, or 3.7 percent), and North Dakota (11,208, or 3.3 percent) are added, it will be seen that nearly 88 percent of all Indians in the continental United States are to be found in 10 States. The remainder of the Indian population is widely scattered with less than 2 percent of the aggregate number in any one State.

FULL-BLOOD RATIO DECLINING

It is only within recent years that statistics have been gathered which approach reliability concerning the blood quantum among Indians. As is to be expected, it is found that among many tribes, particularly in the Great Lakes and the Great Plains areas, where contact with the whites was comparatively early, the number of full-bloods has been relatively low for some time. And it is in these areas, of course, that the decrease in the number of full-bloods is most marked.

Considering the Indian population at large, a comparison of the degree of blood of Indians on census rolls at Federal jurisdictions for the years 1930 (April 1) and 1937 (January 1) reveals a downward trend in the ratio of full-blood to mixed-blood Indians of slightly more than one-half of 1 percent per annum. As was noted above, the greatest relative decline was in areas where the ratio of full-blood to the total number of Indians was lowest. During the period from 1930 to 1937, the total Indian population on census rolls at Indian Office jurisdictions increased over 10 percent, representing an increase among Indians of mixed blood of approximately 22 percent, and among Indians of full-blood of 3.5 percent.

The statistics gathered by the Indian Service are in general supported by the findings of the United States Bureau of the Census. According to the Census figures, during the 20-year period from 1910 to 1930 the percentage of full-blood to total Indian population declined in all states having a large Indian population. Census figures show that a full-blood ratio of 62 percent in 1910 dropped to 52 percent in 1930.

Indian Office data show that the Southwest is the last stronghold of the full-blood. Although New Mexico and Arizona contained only about one-third of the total Indian population on current census rolls at jurisdictions in both 1930 and 1937, more than one-half of the full-blood Indians in both these years were in these two southwestern States. In 1930, of the total enrolled Indian population in Arizona and New Mexico, 98.4 percent were full-bloods, while in 1937, full-bloods constituted 97.6 percent of the total number. The principal tribes in these two States are the Navajo, Pueblo, Papago, Hopi, Pima and Apache.

CHIPPEWAS' RAPID ASSIMILATION

In contrast to the situation in the Southwest, the lowest ratio of full-bloods to total population is found in Minnesota among the Chippewas, the largest of the Algonquian tribes, of whom only some 15 percent are full-bloods. Illustrating the rapid decline of the full-blood population in the predominantly mixed-blood areas, if Indians enrolled in the States of New Mexico and Arizona are excluded, it will be seen that the percentage of full-blood to the total Indian population would have declined from 46.4 percent in 1930 to 41.7 percent in 1937, a drop of 4.7 percent during the 7 years.

A mixed-blood Indian may marry anyone; any resultant progeny will be mixed-bloods. For the full-blood, if the offspring are to maintain the tradition of racial purity, the choice of a spouse is confined to full-blood groups. It is obvious that the full-blood group can increase relatively only as a result of a higher birth rate or a lower death rate, or both, than prevail among Indians of mixed-blood.

INDIANS OF ALASKA

Education and medical supervision over the natives of Alaska was transferred to the Office of Indian Affairs on March 16, 1931. Of Alaska's total population of 59,278, according to the last census enumeration of the United States Bureau of the Census taken as of October 1, 1929, 29,983, or 50.6 percent, were recorded as Indians. Of this number, 19,028 were Eskimauan, leaving 10,955 of other linguistic stocks.

ERROR MARGIN CONSIDERABLE

Despite recent improvements in census taking, reporting, and recording, vital statistics with regard to the Indian population still contain admittedly a considerable margin of error. The vast extent of the larger Indian reservations and the scattered and isolated pattern of life of many of the Indian tribes make the gathering of population data an extremely difficult task. For example, it has been possible to gather accurate data concerning the rate of increase of the Indian population for only an approximate two-thirds of the total number of Indians in the United States. It is believed, however, that the Indian groups covered are sufficiently representative to serve as an indicator of the currently normal growth in the Indian population.

It should be noted that the data in the following table showing Indian population by States, refer to the enrollment at jurisdictions within each State, and not to the number of Indians actually residing there. It is believed, nevertheless, that the Indian population of the several States differs by an extremely small margin from the figures presented in the table, since approximately 85 percent of all Indians

live within the jurisdictions where they are enrolled, and a great number of the remainder have not gone beyond the borders of their States.

A check on the accuracy of the figures compiled by the Indian Service is supplied by data from the decennial census of 1930. The census figures correspond quite closely to the figures of the Indian Service, so far as the ratio of Indian population in each State to the total Indian population is concerned, though the census enumeration of 1930, with regard to Indians dwelling in Oklahoma, Arizona, and New Mexico, shows some departure from the findings of the Indian Service reports. The census figures for 1930 showed only 49.8 percent of the Indians residing in these three States. It is probable that the census percentage is lower than the one shown by Indian Office data chiefly because Indians residing in various eastern States, of which the Indian Office has no record, were included in the census enumeration. Another reason for the higher Indian Office figures for these States is that there has been a slight tendency during the past 8 years for Indians to return to reservations.

Indian Population in Continental United States Under Jurisdiction of the Office of Indian Affairs, by State, Jan. 1, 1938

State	Number	Percent of total	State	Number	Percent of total
Total reported.....	342, 497	100.0	Nebraska.....	4, 619	1.3
Arizona.....	46, 255	13.5	Nevada.....	5, 370	1.6
California.....	1 23, 637	6.9	New Mexico.....	36, 078	10.5
Colorado.....	856	.2	New York.....	5 6, 610	1.9
Florida.....	562	.2	North Carolina.....	3, 391	1.0
Idaho.....	4, 196	1.2	North Dakota.....	11, 208	3.3
Iowa.....	460	.1	Oklahoma.....	6 96, 723	28.2
Kansas.....	2, 047	.6	Oregon.....	4, 741	1.4
Louisiana.....	2 70	(3)	South Dakota.....	28, 030	8.2
Michigan.....	4 2, 404	.7	Texas.....	7 326	.1
Minnesota.....	15, 906	4.7	Utah.....	2, 184	.6
Mississippi.....	1, 947	.6	Washington.....	8 13, 741	4.0
Montana.....	16, 341	4.8	Wisconsin.....	9 12, 467	3.7
			Wyoming.....	2, 328	.7

¹ Includes 8,802 on jurisdiction census rolls, and an additional 14,835 on a special roll made pursuant to the Court of Claims Act of May 18, 1928.

² Estimated figures for the Chetimaha Tribe under Choctaw Agency, Miss.

³ Less than $\frac{1}{10}$ of 1 percent.

⁴ Includes 1,828 Indians organized under the Reorganization Act of June 18, 1934.

⁵ 1937 estimate.

⁶ Includes 24,097 on census rolls and 72,626 members of the Five Civilized Tribes as reported by the U. S. Bureau of the Census, 1930.

⁷ Members of the Alabama and Coushatta Tribes under the jurisdiction of the Kiowa Agency, Okla.

⁸ Includes an estimate of 500 members of the Cowlitz Tribe, Taholah Agency.

⁹ Includes 221 Rice Lake Band Chippewa (special census, July 1930) and 600 Stockbridge Indians, organized under the Reorganization Act of June 18, 1934.

NOTE.—Data are by State of jurisdiction where Indian is enrolled except Louisiana and Texas.

WHERE INDIAN SERVICE, OR THE GOVERNMENT'S EFFORT AS A WHOLE, STILL FALLS SHORT IN MEETING INDIAN NEED

1. The Allotted Land Situation

Touched upon in successive annual reports, this situation remains uncorrected and therefore gets worse each year. More allotted land passes into the heirship status, and the heirship allotments become

more hopelessly subdivided; administrative costs rise higher while allotted land yield grows smaller. Through allotment subdivision, there passes out of effective Indian use (or, indeed, effective use by white lessees) more land each year than can be added through new purchases with Treasury or tribal funds.

The methods, administrative and legislative, through which the allotted land situation can be alleviated, even cured, are known in detail. The year ahead will witness a concentrated effort to make decisive progress, administrative and legislative, toward solving the allotted land problem.

2. Indian Liquor Law Enforcement Imperfect

In Alaska, as yet, there is no liquor enforcement for the benefit of Indians. There is no legislative basis for such enforcement. In the United States, appropriations remain indefinitely inadequate if the effort at enforcement is to be continued throughout the Indian country.

3. Indian Appropriations Still Are Frozen

Only negligible progress has been made in lifting from the Indian appropriation bill the dead hand of past decades. Hundreds of frozen appropriation items still make difficult the efficient and economical use of Indian Service moneys. Things less important are done, things more important are left undone, under the compulsion of the system of frozen appropriations.

4. Uncertainty as to Who Are Indians

Due to treaty clauses, statutes, and appropriation bill clauses, it has come about in some areas that individuals with no more than a trace of Indian blood claim the advantages of Federal gratuity expenditure and are, in many cases, restricted wards of the Government.

Legislation limiting the use of gratuity funds to Indians of some specified degree of blood, preferably not too minute a degree, would assist in the adequate serving of those Indians who unequivocally are such, while at the same time diminishing the stress upon Federal appropriations.

5. The Unjust, Uneconomical System of Handling Indian Tribal Claims Against the Government Continues Unregenerate

In 1929, the Commissioner of Indian Affairs estimated that a century must pass before Indian tribal claims could be finally adjudicated. A century must yet pass; nor, under the system of hit-and-miss Indian jurisdictional bills, still prevailing, will equitable adjudication even then be attained. Legislation such as the Indian Claims Bill of 1936, defeated in Congress, is still the indicated remedy.

Indian Service Appropriations

APPROPRIATIONS FROM UNITED STATES TREASURY FOR FISCAL YEARS (INCLUDING DEFICIENCIES)

Object	1932	1933	1934	1935	1936	1937	1938	1939
General purposes.....	\$2,587,285.73	\$1,840,054.35	\$1,593,500.00	\$1,806,894	\$2,780,880	\$3,343,401.05	\$3,150,441.85	\$2,830,392.63
Industrial assistance.....	1,605,000.00	1,301,000.00	1,233,881.67	1,060,510	3,740,490	2,288,470.00	1,932,500.00	1,931,000.00
Irrigation and water development.....	497,601.00	457,824.00	599,614.00	450,665	1,321,652	1,149,664.00	1,293,998.00	1,317,196.00
Education.....	10,185,400.00	9,771,000.00	9,103,230.00	7,990,665	8,795,120	9,395,375.00	10,048,525.00	10,253,190.00
Conservation of health.....	3,638,000.00	3,508,800.00	3,281,800.00	3,264,565	3,849,620	4,422,360.00	4,965,690.00	5,432,000.00
Support of Indians.....	2,216,300.00	2,156,300.00	2,141,900.00	2,141,815	2,279,350	2,425,000.00	2,770,100.00	2,770,500.00
Miscellaneous (roads, annuities, etc.).....	40,020.00	31,020.00	31,020.00	42,020	771,020	736,020.00	761,020.00	1,019,971.80
Subtotal.....	20,789,606.73	19,065,998.35	17,984,945.67	16,757,064	23,538,132	23,760,290.05	24,922,274.85	25,544,250.43
Construction (general).....	5,570,440.00	1,654,100.00	711,600.00	400,000	981,000	750,900.00	4,291,775.00	4,975,712.00
Roads and bridges.....	670,000.00	1,420,000.00	270,000.00	2,000,000	4,000,000	3,500,000.00	3,000,000.00	3,000,000.00
Total.....	27,030,046.73	22,140,098.35	18,966,545.67	19,157,064	28,519,132	28,041,190.05	32,214,049.85	33,519,962.43

SPECIFIC APPROPRIATIONS FROM TRIBAL FUNDS SUPPLEMENTING TREASURY APPROPRIATIONS

General purposes.....	\$332,913.98	\$126,300.00	\$390,501.00	\$100,000	\$9,153	\$20,000.00	\$159,815.00	\$224,024.21
Industrial assistance.....	180,532.21	45,000.00	188,000.00	55,000	151,000	381,000.00	91,600.00	231,000.00
Irrigation and water development.....	49,500.00	59,000.00	46,950.00	6,720	6,500	7,000.00	5,000.00	203,000.00
Education.....	910,000.00	803,000.00	708,600.00	599,550	389,580	332,820.00	314,995.00	314,995.00
Conservation of health.....	125,000.00	125,000.00	131,550.00	121,490	162,000	80,000.00	-----	5,000.00
Support of Indians.....	1,767,100.00	1,032,380.00	789,100.00	564,155	781,700	768,400.00	788,180.00	859,590.00
Miscellaneous (roads, annuities, etc.).....	50,000.00	25,000.00	25,000.00	-----	-----	105,000.00	105,000.00	11,800.00
Total.....	3,415,046.19	2,215,680.00	2,279,701.00	1,426,915	1,499,933	1,694,220.00	1,464,590.00	1,851,109.21
Grand total.....	30,445,092.92	24,355,778.35	21,246,246.67	20,583,979	30,019,065	29,735,410.05	33,678,639.85	35,371,071.64

OFFICE OF THE SOLICITOR

Nathan R. Margold, *Solicitor*

THE tasks of the immediate staff of the Solicitor have included the representation of the Secretary of the Interior in litigation in the District of Columbia, the drafting of proposed legislation and reports thereon, the preparation of land decisions and departmental opinions and findings, the handling of legal features of Indian reorganization, and the review and other disposition of all other legal matters as are involved in the manifold and varied activities of the Department.

During the fiscal year the Solicitor has represented the Secretary of the Interior in various actions contested in courts of the District of Columbia. Of the four cases in the District Court of the District of Columbia involving an Indian matter, the issuance of oil and gas leases, and the validity of the regulation relating to the practice before the Department by former employees, the Department prevailed in three of the cases. The fourth case was discontinued.

In the same court 28 War Mineral Relief cases were disposed of, 16 by entry of consent decrees and 12 by orders of dismissal. There are 26 remaining of record. Although an attempt is being made to dispose of these remaining cases by agreement, it is expected that the majority will have to be set for hearing.

Two cases were argued in the Court of Appeals for the District of Columbia. In one case, a mandamus suit to compel the issuance of a patent for land, the court sustained the Department on all points. In the other, involving a question relating to the exchange of land, the decision of the lower court, which had sustained the Government's position, was reversed. The decision left open, however, the possibility of consummating the exchange in another manner.

The Solicitor and his staff have also assisted the Department of Justice in the prosecution and defense of actions in other courts. The Solicitor's Office did intensive work in connection with the preparation and trial of the important case brought by the Government against the city and county of San Francisco to enjoin the violation of section 6 of the Raker Act and in advising and conferring with special counsel for the Government in the Elk Hills oil case (*United States v. Standard Oil Co. of California et al.*), wherein the United States sought to be

declared the owner of valuable mineral lands. Decrees in both cases were entered in favor of the United States.

During the year the Solicitor appeared as of counsel in 13 cases which were before the Circuit Court of Appeals for the First Circuit on appeal from the Supreme Court of Puerto Rico and in five cases before the Supreme Court of the United States involving the Government of Puerto Rico or its officials. This litigation work is handled by special counsel for the Government of Puerto Rico under the direction and general supervision of the Solicitor.

A quantitative summary of the work disposed of in the Office of the Solicitor during the fiscal year ending June 30, 1938, is embodied in the following table:

	Land decisions	Opinions of Solicitor	Indian matters	Miscellaneous matters ¹
Pending July 1, 1937.....	348	351	123	122
Received during year.....	598	490	8,340	37,381
Total.....	946	841	8,463	37,503
Disposed of during year.....	776	697	8,334	37,304
Pending June 30, 1938.....	170	144	129	129

¹ "Miscellaneous matters" include such transactions as the following: Contracts for the erection of buildings, road construction, supplies, etc.; reports on legislation; grants, transfers, and cancellations of mineral leases and permits; contracts with irrigation districts; grants and acquisitions of rights of way for power lines and for ditches and canals; withdrawals and restoration of land; determination of power rates.

Disposition was made of 776 land appeals during the year. Land appeals arising under the Taylor Grazing Act are steadily increasing in number and novel questions and problems are being presented for consideration which have added to the task of the lawyers who handle this type of work.

Solicitor's opinions in the total amount of 697 were rendered during the past year as compared with 561 for the preceding year. Of the number rendered, 316 were title opinions and 295 were on damage claims, as compared with the figures 333 and 164, respectively, for the year ending June 30, 1937. Title opinions pending at the termination of the fiscal year 1936-37 totaled 210 whereas only 52 were pending on June 30, 1938. Only 65 damage claims were undisposed of on the latter date.

In addition to these special categories, requests for opinions have covered the usual broad range. The task of resolving new problems arising under old statutes and of construing new statutes which multiply the activities of the various bureaus of the Department with each session of Congress, becomes increasingly greater with the passage of each year. The responsibility which rests upon the legal officers of the Department in directing and safeguarding administrative action is evidenced by the variety and number of questions which are submitted for opinion during the course of a year. The follow-

ing subjects are illustrative of the submissions which were received and acted upon in the past fiscal year:

Authority of the Secretary of the Interior, under section 9 of the Taylor Grazing Act, to accept a contribution consisting of funds received by a State under section 10 of the act, when the contribution is offered to be made to him, pursuant to a law of the State, by a district advisory board which, although appointed by him and functioning under his direction, has been authorized by the State to disburse the funds for certain specified purposes.

Construction of section 1 of the act of June 30, 1936 (49 Stat. 2040), amending section 5 of the War Minerals Relief Act approved March 2, 1919.

Constitutionality of provisions of State law and State constitutions denying the franchise to Indians.

Interpretation of a deed from the Territory of Hawaii to the United States of America purporting to convey Government lands and to reserve to the Territory perpetual grazing rights thereon within the Hawaii National Park and in particular the right of the Hawaiian Agricultural Company to clear national park lands for grazing under the terms of a lease which included an assignment of the right to graze livestock in such area.

Whether manila rope manufactured in the Philippine Islands is dutiable under the customs laws in force and effect for the Virgin Islands; whether such article may be considered a product of American manufacture under the "Buy American" provisions of the act approved March 3, 1933 (47 Stat. 1489); and whether the Virgin Islands Company may pay the amount of the import duty which is due on the article in the event it is dutiable.

The right and power of the Consumers' Counsel of the National Bituminous Coal Commission to appeal from orders of the Commission, to bring judicial proceedings to compel the Commission to furnish information to him and to be represented in both such proceedings by attorneys of his own choice.

Interpretation and administration of the act of September 1, 1937 (Public, No. 411, 75th Cong., 1st sess.), relating to the production and export of helium.

Authority of Secretary of the Interior to repossess or reacquire lands and improvements thereon by certain full-blood Choctaw Indians of Mississippi under contracts made under the authority of section 9 of the act of May 25, 1918 (40 Stat. 561, 573), and similar acts, and to hold the title thereto in trust for such Indians as he may designate under the authority given by section 5 of the act of June 18, 1934 (48 Stat. 984).

Responsibility of State Board for Vocational Education under the Smith-Hughes Act (39 Stat. 929), for employing, discharging, and fixing the tenure of its employees, and for making requisitions on the State custodian for vocational education for the disbursement of Federal funds.

Liability of individual members of the Quapaw Tribe of Indians in Oklahoma for Federal income taxes.

Reports on bills to Congress and to the Bureau of the Budget which originated in or cleared through the Solicitor's Office totaled 623 in number. Drafts of 31 bills sponsored by the Department were prepared or reviewed by the Solicitor's staff. Many of the legislative measures have required extensive research and preparation. A substantial number of bills, either sponsored by or important to the Department, progressed to final passage during the two sessions. The following measures are specially noteworthy:

H. R. 10024, to establish the Olympic National Park in the State of Washington.
H. R. 4852, to provide for the creation of the Saratoga National Historical Park in the State of New York.

H. R. 6652, to provide for the administration and maintenance of the Natchez Trace Parkway in the States of Mississippi, Alabama, and Tennessee.

S. 3689, to govern the leasing of Indian lands for mining purposes.

S. 2163, to authorize the deposit and investment of Indian funds.

H. R. 7874, to provide for the leasing of State, county, and privately owned lands for the purpose of furthering the orderly use, improvement, and development of grazing districts.

S. 3310, to amend section 35 of the Mineral Leasing Act (which was included in the Interior Appropriation Act).

S. 2650, to authorize the completion, maintenance, and operation of the Fort Peck project for navigation, and for other purposes.

H. R. 8008, to provide for the purchase of public lands for home and other sites.

Work in connection with the contracts with the Los Angeles Bureau of Power and Light and the Metropolitan Water District relating to the sale of Boulder Dam energy, which were executed shortly after the close of the fiscal year, required the active participation of the Solicitor in numerous conferences and hearings which were held during the course of the negotiations for the purpose of reconciling the conflicting interests and resolving the many problems that were involved. The major portion of the Solicitor's time and efforts was devoted to the preparation of these two contracts which will result in the accrual of additional revenues and other substantial benefits to the Government.

Various legal problems arising with respect to the exportation of helium under the Helium Act of September 1, 1937, have demanded consideration. Special attention was given to the review of the regulations governing the production and sale of helium and the preparation of amendments thereto.

Legal questions relating to grazing matters have increased the volume of work of the Solicitor's staff. In addition to the preparation of a number of opinions dealing with the Taylor Grazing Act, considerable time was spent on the work of revising the Federal Range Code, a matter of great importance to the Division of Grazing.

Numerous other miscellaneous legal matters arising in connection with the various activities of the Department were reviewed and disposed of during the year by the Solicitor's staff.

The burden of work of the lawyers attached to the General Land Office has increased appreciably due to the new conservational policies that have become effective. Matters relating to the issuance of leases under the Taylor Grazing Act and the new type of homestead work have accounted to some extent for this increase. The new policy affecting the management of revested grant lands inaugurated pursuant to the act of August 28, 1937, has presented novel legal problems for solution. Matters arising under the oil and gas and other mineral leasing laws continue to bulk large in the work of the legal section.

A noteworthy accomplishment was the codification of the regulations of the Land Office. These regulations are now for the first time available for general use in an up-to-date form.

Oil and gas leasing matters, particularly the review and revision of unit plans, continued to require the careful attention of the lawyer assigned to the Geological Survey. For the period preceding the past year, only 47 plans were approved, involving 662,468 acres. During the fiscal year 44 plans involving 591,116 acres were approved, indicating notable progress in this field of work. In addition to the regular legal work the codification of the operating regulations of the Geological Survey was completed.

The numerous regulations and orders governing the activities of the Indian Service were codified during the year by the legal staff of the Indian Office. This work will be of considerable value not only to the Department but also to the Indians. The relationship of the Indians to the new Government agencies created a number of special legal problems during the course of the past year which the Solicitor's Office, with the cooperation of the Federal agencies directly concerned, was able to solve.

The important business of administering the estates of deceased Indians, other than members of the Osage Tribe or of the Five Civilized Tribes, is handled by a staff which is still numerically inadequate. Improved administrative measures, although increasing the work of the probate attorneys, have resulted in large savings to the Indians. All except two of the eight probate divisions are now in an acceptable condition. Additional assistance would improve the situation in those two divisions. The retention of an auditor to check all Osage guardianships has justified expectations. The Indians' rights are now much better protected. During the past year certain unsatisfactory conditions were disclosed in connection with probate matters. It is expected that remedial recommendations which will lead to the improvement of these conditions will result from the careful study that is being made. The need for a revision of the regulations relating to the sale and leasing of Indian lands was revealed by the exhaustive study that was made during the year of Indian land matters. As a result recommendations were made by the Solicitor's Office which are now being examined by the administrative authorities.

Conferences with parties interested in the various Indian irrigation projects, with officials of the Irrigation Service and with United States attorneys and representatives of the Department of Justice in connection with pending litigation and the preparation of suits to be instituted affecting the various projects, have caused an increased demand on the time of the legal staff attached to that Service. The lawyers of the Service actively participated in a number of cases of importance in connection with irrigation projects. Of chief interest is the case of *United States v. Powers et al.* which was decided adversely

to the Government on appeal. In cooperation with the Department of Justice, counsel attached to the Service did considerable work preparatory to the filing of a petition for certiorari in the Supreme Court. The ultimate decision will affect practically every Indian irrigation project in the country.

The legal work relating to Indian organization has involved primarily the task of assisting the Indian tribes in carrying out the powers vested in them by the Indian Reorganization Act and the Oklahoma and Alaska amendments, although questions requiring interpretation of the acts continue to demand consideration. Assistance in the drafting of organization regulations and legal documents needed in carrying out their programs was rendered to the Indian tribes. The Solicitor's Office contributed to the development of a procedure intended to insure a better understanding of and participation in the functioning of credit associations by the Indians. Several hundred ordinances and resolutions passed under constitutions and charters which have been adopted were reviewed and in addition 16 constitutions and 24 charters were approved. Due to the analysis of basic legal questions, notable progress was made with respect to the establishment of a functioning organization in Alaska.

The work of the Bureau of Reclamation has continued to require extensive legal services in Washington and the field. Lawyers in the Washington office approved 219 construction and supply contracts involving an aggregate expenditure of \$97,644,413.32, as compared with 147 contracts involving \$22,553,571.99 for the preceding year. The task of drafting the complicated contracts in connection with the Central Valley project and the repayment contract to be entered into with the Northern Colorado Water Conservancy District, involving large sums of money required intensive work on the part of lawyers of the bureaus and the special attention of the Solicitor.

In addition to their regular work counsel for the Bureau have devoted a considerable amount of time to litigation. A number of condemnation cases have been instituted in connection with the various reclamation projects requiring the preparation and examination of pleadings. Counsel actively participated in the trial of the important case of *United States v. Tilley* which was instituted as a result of the construction placed by the Department on the Warren Act contracts. A member of the Solicitor's staff was present at the trial of this case because of its significance in relation to the case of *Nebraska v. Wyoming*. In the latter case the motion to intervene filed by the United States was granted and it is expected that two attorneys responsible to the Solicitor will be required to spend a substantial portion of their time on this case alone for some time in the future because of its relation to projects on the North Platte River and the fact that basic principles of water law are involved.

WAR MINERALS RELIEF COMMISSION

Arthur J. Barber, *Acting Commissioner*

I. UNDER THE ACT OF FEBRUARY 13, 1929 (45 STAT. 1166)

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA

Within the period under review the court dismissed 17 cases and entered 14 decrees. The status of cases filed under the act of February 13, 1929, is:

Total petitions filed.....			348
Total cases dismissed by the court.....			91
Decisions by the Secretary of the Interior under decrees:			
	<i>Awards</i>	<i>Denials</i>	
To June 30, 1937.....	167	24	
July 1, 1937, to June 30, 1938.....	12	2	
			205
Cases pending in court.....			30
Decrees entered and pending in the Commission.....			22
			348

Under authority of decrees from the court the Secretary of the Interior made 12 awards totalling \$120,203.18, and 2 denials.

An appropriation was made in the Second Deficiency Appropriation Act, Public, No. 723, Seventy-fifth Congress, approved June 25, 1938, to pay four awards totaling \$15,126.26. Eight awards totaling \$105,076.92 were certified and are pending a future deficiency appropriation.

The Commission has further recommended one denial.

UNDER THE ACTS OF MAY 18, 1936 (49 STAT. 1355) AND JUNE 30, 1936 (49 STAT. 2040)

Under these acts, 335 applications for review were filed with the Secretary of the Interior before December 31, 1936. Since that date the number of eligible applications has fluctuated by reason of changes of status and by reason of dismissals or by decrees which authorize a review of the item of interest, coming from the Court under the act of February 13, 1929, and by reason of late filings under the act of May 18, 1936, which may be accepted at any time since no limit for filing was provided in that act.

	<i>Application</i>
Accepted for review under act of May 18, 1936.....	80
Accepted for review under act of June 30, 1936.....	153
Acceptance pending authority to file claim.....	11
Dismissed by court.....	21
Pending in court.....	25
Rejected as ineligible under either act.....	48
Total as of June 30, 1938.....	338

II. UNDER THE ACT OF MAY 18, 1936 (49 STAT. 1355)

This act provides that when the decree of court has authorized a review of the loss of interest to March 2, 1919, the Secretary of the Interior shall reconsider interest to the date of passage of the act.

The act fixes a limitation of \$1,250,000 to be awarded under this amendment. An initial appropriation of \$500,000 (49 Stat. 1619, June 22, 1936) has been disbursed, and an additional appropriation of \$650,000 was made (50 Stat. 221, May 28, 1937).

Within the period under review, the Secretary of the Interior made 25 awards totalling \$378,258.63, and denied 4 claims.

In the previous fiscal year \$740,412.11 was awarded and has been paid. In the fiscal year under review 13 awards totalling \$361,607.44 have been paid; and 12 awards totalling \$16,651.19 have been made and certified, but are not yet paid.

The unexpended balance of appropriation on June 30, 1938 is \$47,980.45, which, by terms of the Appropriation Act of May 28, 1937 (50 Stat. 221) would revert to the Treasury as of July 1, 1938. Including the above sum, the balance of unexpended authorization is \$147,980.45.

Under this Act of May 18, 1936, the Secretary of the Interior has considered 32 claims. Forty-eight claims are pending in the Commission; but this number is subject to a further fluctuation.

III. UNDER ACT OF JUNE 30, 1936 (49 STAT. 2040)

This act authorized claimants who failed to file suit under the act of February 13, 1929, or whose suit so filed abated, to petition the Secretary of the Interior to review their claims on matters of law in the light of decisions of the court in similar cases, and to make awards; and provided for the rights of deceased claimants to descend to their legal successors; and provided for the rights of dissolved corporations to descend to any officer, director, stockholder or legal representative who shall be entitled to the benefits of this act; provided, that such claims be filed within 6 months of approval of this act.

Under this act, 231 applications for review were filed within the limitations of the act and prior to December 31, 1936. The status of these applications is as follows:

Accepted for review.....	153
Pending authority to file claim.....	11
Suits abated; grounds for reopening not established.....	21
In court under act of Feb. 13, 1929, pending decision as to the right to petition for a review under the act of June 30, 1936.....	25
Rejected as ineligible.....	21

The Congress appropriated \$100,000 (50 Stat. 221, May 28, 1937) for immediate payment of claims. There is no authorization to limit the amount which may be paid under this act.

In the previous fiscal year \$45,383.84 was awarded and paid.

In the fiscal year under review, the Secretary of the Interior made 12 awards totalling \$44,100.76, which have been paid; and made 15 awards totalling \$38,817.24 which have been certified but remain unpaid; and denied 15 claims.

The unexpended balance of the appropriation is \$10,515.40, which, under the terms of the Appropriation Act of May 28, 1937 (50 Stat. 221), would revert to the Treasury on July 1, 1938.

Under this act of June 30, 1936, the Secretary of the Interior has considered 47 claims of the 153 claims accepted for review as of June 30, 1938; he has made 32 awards totalling \$128,301.84, and 15 denials. There are 106 applications accepted and pending in the Commission; but this number is subject to a further fluctuation.

SUMMARY

Decisions by the Secretary of the Interior

	<i>Awards</i>	<i>Denials</i>	<i>Total</i>
Act of February 13, 1929.....	179	26	205
Act of May 18, 1936.....	28	4	32
Act of June 30, 1936.....	32	15	47
Total decisions to June 30, 1938.....	239	45	284

Pending Before the Secretary of the Interior

Recommendation by the Commission; 1 denial.....	1
Under act of February 13, 1929:	
Cases pending in Court.....	30
Decrees pending in Commission.....	22
	52
Under act of May 18, 1936.....	48
Under act of June 30, 1936.....	141
Total claims pending examination and decision by the Secretary of the Interior, as of June 30, 1938.....	242

DIVISION OF TERRITORIES AND ISLAND POSSESSIONS

Ernest Gruening, Director

THE Division of Territories and Island Possessions has continued its administrative functions of coordinating and supervising the activities under its jurisdiction, which include the Governments of Alaska, Hawaii, Puerto Rico, and the Virgin Islands; also the Alaska Railroad, the Alaska Road Commission, Alaska insane, the Consolidated Purchasing and Shipping Office in Seattle, the Virgin Islands Company, and the colonization projects on Jarvis, Baker, Howland, Canton, and Enderbury Islands.

The Director made an extensive trip to the South Seas in the fall of 1937, in the course of which he inspected Kingman's Reef, use of which as a station in commercial plane flights to the Antipodes had been projected, and the Phoenix Islands, including Canton, Enderbury, Hull, Phoenix, and Sydney. An Executive order proclaiming sovereignty of the United States over Canton and Enderbury Islands and placing them under the supervision of the Interior Department was issued on March 3, 1938. At approximately the same time, colonists from Hawaii were landed on these two islands, the American flag raised, the construction of living quarters and lighthouses begun, and radio facilities established. Preparation of the lagoon on Canton Island for the use of commercial planes has proceeded rapidly since that time. A visit to the Samoan Islands was included in this itinerary.

The Director later left for an extended visit in the Territory of Alaska for the purpose of making a comprehensive survey of the Matanuska Valley colonization project and to discuss matters relating to the Alaska Railroad, Alaska Road Commission, and other activities, with the various officials concerned.

TERRITORY OF ALASKA

During the fiscal year 1938 the administrative functions of the Department in connection with the Office of the Governor of Alaska, the Alaska Railroad, the Alaska Road Commission, and the care of the legally adjudged insane of Alaska, were performed through the Division of Territories and Island Possessions. The Seattle Consolidated

Purchasing and Shipping Office was placed under the administrative supervision of the Division effective June 1, 1938. The Division cooperated with the several branches of the Interior Department and the other departments and agencies of the Government having activities in Alaska, in determining matters of policy with reference to the Territory. These activities took the form of consultation and aid in legislative and budget matters, in aiding in the coordination of Federal efforts for the development of the Territory, notably in detailing personnel and supplying information to the National Resources Committee in connection with the report, Alaska—Its Resources and Development, prepared at the request of the President pursuant to Concurrent Resolution 24 passed August 21, 1937.

During the fiscal year 1938 the Alaska Railroad operated a modern transportation service the year round between Seward and Fairbanks, a distance of 470.3 miles; also on branch lines totaling 30.5 miles into the Matanuska and Nenana coal fields. The summer passenger-train schedule placed in effect during June 1937 provided for three round trips a week between Seward and Fairbanks with supplementary service out of Fairbanks to Nenana and McKinley Park and out of Seward to Anchorage and Palmer. Passenger train service was reduced to two round trips each week on September 7, and was further reduced to the winter schedule of one round trip each week on September 20. Mixed train service was operated between Anchorage and Matanuska points on the Matanuska branch line one or two trips each week, depending upon the volume of traffic. Freight train service varied from one round trip to two round trips each week between Seward and Fairbanks, governed by the volume of freight and the steamer arrivals at Seward. River boat service was maintained during the season of navigation with sailings from Nenana to Tanana, Ruby, Holy Cross, and Marshall every 2 weeks.

Rail line passengers numbered 26,026; rail line passenger-miles, 4,247,677; rail line freight, 155,833 tons, of which 106,636 tons were coal. Operating revenues amounted to \$2,212,844.65 and nonoperating income totaled \$1,603.60. Operating expenses were \$2,142,617.97. With collections from the operation of ocean-going vessels amounting to \$4,873.41, the total income in excess of expenses was \$76,703.69. At the beginning of the fiscal year, there remained an unobligated balance of \$543,211 from a Public Works Administration allotment of \$737,000 made in May of 1937. On June 30, 1938, there still remained an unobligated balance in this allotment of \$124,883.92. This allotment is being used for needed rehabilitation and improvement work on the Alaska Railroad—the construction of a bridge across Knik River, a tourist hotel at Mount McKinley Park entrance, ballasting, line changes, and other items of improvement and rehabilitation. In May 1938, \$210,400 was provided by the Works Progress Administra-

tion for the employment of relief labor in ballasting and surfacing the track and to replace deteriorated ties. The greater part of this allotment remains for expenditure for the fiscal year 1939, but on the last day of June 1938, 332 persons were employed on these projects.

The Alaska Road Commission is charged with the construction and maintenance of roads, bridges, and trails in Alaska outside national forests. The construction and maintenance of airfields, telephone lines, and shelter cabins is also undertaken for the Territory. Funds are made available by Congressional appropriation, from the Alaska fund and from contributions by the Territory and others. In addition, during 1938, \$388,386 from a Works Progress Administration allotment was available for expenditure. The total expenditure from all sources by the Commission during the year was \$1,376,792.31. The work accomplished during the fiscal year may be summarized as follows:

New construction:

56¾ miles of road of which 16½ were surfaced.

54 miles of sled road and a number of bridges.

Improvement:

74¼ miles of road regraded and widened.

127½ miles of road surfaced and 871 metal culverts installed.

Maintenance:

1,915 miles of road.

80¼ miles of tramway.

557 miles of sled road.

2,061½ miles of permanent trail.

304 miles of temporary flagged trail.

The legally-adjudged insane of Alaska are cared for under contract negotiated by the Secretary of the Interior. Under provisions of law, the Sanitarium Co. of Portland, Oreg., has provided care and treatment for a number of years. The present contract became effective January 15, 1938, for a period of 5 years, at the rate of \$648 per patient per annum. The Department continues to be represented at the hospital by a psychiatric supervisor. At the beginning of the fiscal year 296 patients were receiving treatment. During the year 73 patients were admitted, while those deceased, discharged or transferred, numbered 57, leaving 312 persons in the institution on June 30, 1938.

TERRITORY OF HAWAII

Commerce of Hawaii, now approaching a total of \$250,000,000 annually, showed an increase for the calendar year of 1937, of \$26,433,227 over the value of the commerce in the previous calendar year. The Territory had a favorable trade balance of \$18,406,603, the total exports being valued at \$132,239,807, while the value of imports was \$113,833,204. By far the largest share of this commerce was between the United States and the Territory.

The pineapple industry is making long strides in overtaking the sugar industry as the primary commercial endeavor of the Territory. The value of the shipments of canned pineapple and pineapple juice increased by approximately \$4,000,000 each, while the value of sugar exports decreased by approximately the same amount.

The Territorial unemployment compensation law now in effect has three primary objectives. First, it provides for the accumulation of reserves during periods of expanding employment which may be used for the payment of benefits to persons who may subsequently become unemployed through no fault of their own. A second objective is the stabilization of employment and in the third place, the unemployment compensation law provides for the maintenance of free public employment offices to assist workers in obtaining suitable jobs, and to assist employers in obtaining suitable workers.

Special efforts were made in renewing cane land leases to the end that the Territory share in the profits derived from the leased areas. Two of the more important of such leases, covering large areas of land, completed during the year, include the lease of Hilo Sugar Co. of 2,265.656 acres of the land of Piihonua, Hawaii, and one to the Kekaha Sugar Co. covering 29,698 acres at Waimea, Kauai.

Collections by the Commissioner of Public Lands from all sources during the year showed an increase of \$63,605 over the preceding year. Due to the sugar quota, several lessees of caneland have discontinued the use of such land for cultivation and are using the same for pasturage purposes.

The amount of sugar which may be produced in 1938 in the Territory under the 1937 Sugar Act is approximately 1,135,000 tons raw value. Of this amount, approximately 951,000 tons may be shipped to the mainland and 30,000 tons may be sold locally. The difference between the amount which may be produced and the amount which may be marketed provides a reserve. Benefit payments to the Hawaiian sugar growers and other farmers in the Territory during the year amounted to approximately \$4,900,000 through the Agricultural Adjustment Administration and Soil Conservation and Domestic Allotment Act.

Upon hearing of new possibilities for low-rent housing and slum clearance in the Territory, the housing authority appointed by the Governor began intensive work to have funds earmarked for Hawaii. On April 11, 1938, there was set aside for Hawaii \$2,400,000.

One of the discordant notes which occurred in the administration of the islands during the year was the strike of interisland seamen and drydock workers which commenced late in May 1938, and crippled transportation between the islands for nearly 3 months. Regular service was resumed early in August when men in most of the departments returned to work.

Funds made available by the Public Works Administration and the Works Progress Administration provided for construction of roads and highways, buildings, parks, public utilities, and flood control in the islands during the fiscal year. Besides the construction work, a number of statistical, research, and educational projects also were carried on, providing work for clerical and other employees.

HAWAIIAN HOMES COMMISSION

The Hawaiian Homes Commission was created by the Hawaiian Homes Commission Act—1920, to rehabilitate Hawaiians by placing selected families on Government lands set aside for this purpose in the nature of 99-year leases of farm, pastoral, and residence lots and with long-term loans at low rates of interest.

Approximately 3,800 Hawaiians included in 650 families are now occupying farms and lots on the Islands of Oahu, Molokai, and Hawaii. To the 203 families on Molokai, \$262,047.62 was paid for the produce raised on their farms, consisting of corn, potatoes, pineapples, and other food crops.

On Hawaii, \$80,000 is being expended for an addition of about 175 lots to the existing 231 residence lots located at Keaukaha, a suburb of the city of Hilo, on the Island of Hawaii. In addition to these lots, two community buildings to be used for social, educational, recreational, and general welfare work among the Hawaiians, have also been constructed as part of this project.

PUERTO RICO

The finances of the insular Government are in excellent condition. Total receipts for the year aggregated \$43,298,448, while the expenditures amounted to \$41,666,329, leaving an excess of receipts over expenditures of \$1,632,119. Imports were valued at \$93,314,783, of which \$84,987,994 came from the continental United States. Exports were valued at \$82,052,341, of which \$79,808,113 were shipped to the continental United States.

Various laws recommended by the Department were enacted by the Seventy-fifth Congress: (1) Authorizing the legislature of Puerto Rico to create public corporate authorities to undertake slum clearance and provide dwelling accommodations for families of low income; (2) ratification of all joint resolutions enacted by the legislature of Puerto Rico and the former legislative assembly; (3) authorizing the Governor of Puerto Rico to fill vacancies in the legislature of Puerto Rico caused by death, resignation, or otherwise, of senators and representatives, until the necessary general election; (4) exemption of persons traveling between Puerto Rico and the continental United States from payment of a stamp tax on steamship tickets; (5) to

correct the citizenship status of certain persons who were born in Puerto Rico; (6) extension of provisions of section 21 of the Bankhead-Jones Act to Puerto Rico providing for the development of cooperative agricultural extension work; (7) to transfer certain parcels of land including the Escambron tract to the people of Puerto Rico. Strenuous efforts were made to have certain provisions of the Social Security Act extended to Puerto Rico, but without success.

Since the creation of the Institute of Tourism of Puerto Rico, an extensive campaign has been undertaken to bring to the attention of tourists the natural beauties and attractions of Puerto Rico, its historic forts and other places of historical interest. The government of Puerto Rico recently sponsored a cruise for Government employees to the island. More than 400 persons took advantage of the opportunity, sailing on the steamship *Iroquois*, spending 3 days and 2 nights in Puerto Rico and 1 day in St. Thomas, Virgin Islands. Approximately 18,000 visitors were entertained during the first 5 months of 1938, as compared with 7,000 visitors for the same period last year.

A loan of \$972,000 and a grant of \$795,273, or a total of \$1,767,273, has been authorized for the construction of a graving dock at San Juan. Plans and specifications are now being prepared and work on the project will start early next fall.

THE VIRGIN ISLANDS

The program of economic rehabilitation which has been carried on for a number of years in the Island of St. Croix was seriously endangered by a prolonged and severe drought. The sugar business, which is the basic industry of that island, suffered a severe setback. The benefits of increased sugar quotas under the Sugar Act of 1937 for the Virgin Islands were lost as a result of the drought. Sugar production fell off approximately 50 percent in tonnage and approximately 60 percent in value due to low prices.

The homesteading program, which depends for the most part on sugarcane production as a cash crop, was seriously affected by the drought, 298 homesteaders in the island of St. Croix receiving for the year 1938 a gross return which was only 29 percent of their 1937 income.

On the other hand, continued improvement was shown in St. Thomas, where the shipping business is the important industry. A total of 814 ships, with total tonnage of 3,239,975 tons, called at the port of St. Thomas during the fiscal year. Transshipment was inaugurated for a trial period at the port of St. Thomas of bauxite originating in British Guiana and destined for Canada. This use of an American port by foreign interests signalizes the advantages of the port of St. Thomas over competing ports in the Caribbean area.

The Army Engineer Corps has continued its engineering surveys of the harbor of St. Thomas with a view to beginning authorized harbor improvement work in the new fiscal year.

Development of the tourist trade and winter resident trade continues to make gradual progress. The Bluebeard Castle Hotel was turned over to a private operator under a mutually satisfactory lease, after advertisement for bids, on December 1, 1937. The period of Government operation of this hotel while under construction, during which costs were paid from income of the hotel, ended on November 30 with a slight profit which has been deposited in the United States Treasury.

The cattle business, which is of second importance in the Virgin Islands, was seriously endangered by the imposition of restrictions against shipments to Puerto Rico, which is the important market for that industry. A careful study of the cattle business was made by an expert whose numerous recommendations are being studied with a view to expanding the cattle business and establishing it on a firm and economic basis.

Work-relief allocations were made which permitted the continuation of a road-improvement program which has been of substantial benefit to the islands. Great progress has been made in improving the sanitary condition of the towns in the Virgin Islands, through the extension of sewer and salt-water flushing systems in Charlotte Amalie and through the surfacing of streets and improvements of street drains in all the towns in the Virgin Islands.

The management of three urban housing projects constructed by the P. W. A. Housing Division was transferred to the government of the Virgin Islands on September 1, 1937. These housing units are now more than 80 percent occupied and will soon be completely occupied.

Plans are now in preparation by the Procurement Division of the Treasury Department for the major repair and reconstruction of numerous historically and architecturally interesting Federal buildings which were transferred to the United States Government by the Danish Government at the time of the purchase of the Virgin Islands. Reconstruction work will be undertaken in the new fiscal year.

Studies conducted by the Department of Labor, the Department of State, and the Department of the Interior with respect to the enforcement of the United States immigration laws in the Virgin Islands have led to the administrative reorganization and improvement in the methods and means of enforcement.

THE VIRGIN ISLANDS CO.

During the fiscal year the Company cultivated 3,000 acres of sugarcane, manufactured 2,300 tons of raw sugar and about 100,000 gallons of rum. It sold during the year 40,000 cases of Government House

rum, employed about 900 persons, and paid about \$40,000 in taxes to the local government.

A severe and prolonged drought caused great damage and loss to the sugarcane crop. Many fields were lost and the crop for the year 1939 will be even less than that for 1938. Plans are under way for drilling deep wells to provide against droughts in the future.

The company furnished a market for the cane grown by 700 homesteaders. During the year the Angostura-Wuppermann Corporation began the manufacture of Angostura Bitters in the Virgin Islands, and the Virgin Islands Co. is furnishing one of the ingredients for the bitters.

EQUATORIAL AND SOUTH SEA ISLANDS

Four cruises were made from Honolulu, T. H., to Jarvis, Baker, and Howland Islands, during the year, under the supervision of the field representative of the Department of the Interior, carrying water, food, and other supplies for the maintenance of the colonists stationed there. Early in 1938 the Division also took over the administration of the islands of Canton and Enderbury, acting under Executive order of March 3, 1938, and established colonies on these two islands, similar to the ones on the other equatorial islands. High-powered radio equipment was set up on Jarvis and Canton Islands, for the purpose of reporting weather information daily to the United States Weather Bureau station in Honolulu.





UPPER: A SEMIURBAN LOW-COST HOUSING DEVELOPMENT IN PUERTO RICO.
LOWER: A CEMENT PLANT CONSTRUCTED BY THE PUERTO RICO RECONSTRUCTION
ADMINISTRATION.

PUERTO RICO RECONSTRUCTION

ADMINISTRATION

Miles H. Fairbank, *Assistant Administrator*

ESTABLISHED by Presidential order dated May 28, 1935, under the authority of the Emergency Relief Appropriation Act of 1935, the Puerto Rico Reconstruction Administration has operated in the Island of Puerto Rico since September 1935. Charged with the responsibility of expending the emergency funds assigned to it for the relief of the unemployed in the island it is carrying out a comprehensive program of economic and social rehabilitation tending to correct the unwholesome social and economic trends from which this insular possession has suffered acutely.

The fundamental economic problem in Puerto Rico arises from the fact that while the island is essentially agricultural, having little or no industry, its important crops—sugar, coffee, and tobacco—because of existing legislation or lack of markets, will not support the dense population. In an island where every square foot of land should be intensely cultivated, thousands of acres are either idle or inadequately used.

The year has seen considerable progress along the many fronts on which the Puerto Rico Reconstruction Administration is operating. About 2,000 agricultural workers and their families have been established in subsistence farms on which modest priced houses have been constructed, and a definite trend has been started toward the growing of subsistence crops, as well as a new type of agriculture, providing other sources of income to supplement sugar, coffee, and tobacco. The P. R. R. A. Service Farms throughout the island have been producing swine, goats, and chickens for distribution in an effort to achieve a more balanced agriculture. The marketing of new crops through the establishment of packing houses, grading centers, and market research, as well as the establishment of new cooperatives and the encouragement of those already organized, has formed an important part of the program.

Realizing that the success of this type of program depends on the ability to develop leadership and local responsibility, P. R. R. A. has aided the development of the educational system of the island this year by continuing to build more schools, both primary and second

unit, as well as completing the building program started 2 years ago at the University of Puerto Rico.

The social service program of the P. R. R. A. has expanded rapidly and is having a decided effect upon the successful operation of the program as a whole. Much employment has been given in the construction of needed public works for the various municipalities throughout the island, as well as the insular and Federal Governments. The program for the development of the hydroelectric resources of the island has continued throughout the year, along with the program for soil conservation, cattle tick eradication, hurricane static research and similar projects indirectly but vitally affecting the entire program. There were 24,095 persons employed on P. R. R. A. works on June 30, 1938.

During the year Ernest Gruening, Director of the Division of Territories and Island Possessions, who had also served as Administrator of the P. R. R. A. since its inception, resigned the latter post and the Honorable Harold L. Ickes, Secretary of the Interior, was appointed Administrator by the President. The main office was then transferred to San Juan, all division heads being placed under the immediate supervision of the Assistant Administrator. Considerable reduction of personnel was effected in the Washington office, which has become a liaison and contact office of the Administration. These changes and the subsequent reorganization and consolidation of various functions have resulted in reducing the average cost of administration from approximately \$140,000 per month to an average of \$65,000 without curtailing the effectiveness of the program.

RURAL REHABILITATION

For the general rural rehabilitation of Puerto Rico and in carrying out its own agricultural program the P. R. R. A. has expended to date the total sum of \$19,389,692. These funds have been used for the employment of agricultural workers and the purchase of agricultural implements, fertilizers, spraying materials, and selected seeds, thereby supplying newly created farmers with facilities to carry out the approved agricultural projects. Large tracts of uncultivated or poorly cultivated lands owned principally by absentees have been purchased and subdivided into small farms. The lands acquired to date include the American Suppliers property, formerly a 4,000 acre farm and now subdivided into about 500 small farms; Castaner and Llinas' farms, totaling 1,692 acres, formerly devoted exclusively to coffee growing as the cash crop and now divided into 200 small farms devoted to the cultivation of diversified crops as an example of a new type of agriculture for the coffee region; Zalduondo, originally a farm of 1,500 acres and now subdivided into more than 200 farms from

1 to 20 acres, and St. Just, a farm of 433 acres and now subdivided into 260 small farms. This latter project, close to San Juan, is an interesting experiment in slum clearance through semiurban development.

Land subdivision has been carried on in the Lafayette district. Five thousand acres under cane cultivation purchased by the P. R. R. A. from Sucrs. de C. & J. Fantauzzi have been subdivided into 12 land cooperatives with an approximate average of 400 cuerdas each. Of the 5,000 additional acres of marginal lands also purchased from Sucrs. de C. & J. Fantauzzi, part has been assigned by the P. R. R. A. for resettlement purposes. At the present time 405 1-acre parcels have been segregated and low-cost concrete houses built thereon to be occupied by Lafayette resettlers, who in turn are members of the land cooperatives.

In Vieques, 146 small farms have been created.

Del Rio Plantation, a zone of arid land, is being converted into a productive region by P. R. R. A. technical experts and has been subdivided into 57 small farms. It is being used as a demonstration project for the better utilization of the arid regions of the island.

Subdivision is being carried on also at Farm Marini, recently purchased near Mayaguez. Eighty-nine families will soon be established on an equal number of small tracts there. This also is a semiurban development like St. Just, designed to provide facilities for subsistence to workers with part-time employment.

To this must be added the land acquired from farmers of the coffee, tobacco, and fruit regions, to whom assistance was extended, supplying them part-time labor, fertilizers, and other aid in exchange for which the cooperating farmers agreed to sell to P. R. R. A. land at one-half its appraised value. In those regions the P. R. R. A. has established approximately 2,700 new homesteaders on small tracts of land of from two to three acres each.

Thus more than 40,000 acres located in different parts of the island are being utilized directly in the rural rehabilitation program of the P. R. R. A. In connection with the rural housing program, which is aimed at substituting for the typical fragile old shack of the Puerto Rican peasant decent facilities for comfortable living, 2,080 houses of concrete, treated lumber and rammed earth have been constructed.

In each one of the rural resettlement projects there is a central service farm in charge of a farm superintendent, who gives technical advice to the resettlers and who is responsible for all administrative matters.

The modern poultry plant established at La Plata's central service farm is now distributing weekly an average of 500 chickens among homesteaders. Surplus eggs and chicks are auctioned to the public for use in improving the breeding of poultry throughout the island.

Swine and goats are also distributed by the central service farms among the homesteaders. The P. R. R. A. imported 150 pedigreed Anglo-Nubian goats and 60 pure-bred Duroc Jersey swine for breeding purposes. A number of the boars and bucks has been loaned to the Insular Extension Service for stud in different parts of the island. The value of the P. R. R. A. activity in this direction is shown by the fact that during the past year two private poultry plants selling baby chicks and breeding stock to farmers have been established in the island.

One of the most important activities carried on by the P. R. R. A. for the development of the island's livestock, is the eradication of the fever-producing cattle tick. This program is conducted in cooperation with the Bureau of Animal Husbandry of the United States Department of Agriculture and the Insular Department of Agriculture and Commerce. Work has been completed in the western zone where there are 315 dipping vats operating. One hundred and fifteen thousand eight hundred and sixty-three cattle, 18,776 horses and mules, and 79,688 goats and sheep were treated last year. In the central zone, where vat construction was carried on during the year, there are 282 vats completed and dipping will begin shortly. Construction of vats has been started in the eastern and final zone. Authorities agree that as soon as the eastern zone is covered, the island will be totally free from fever tick.

The soil of Puerto Rico constitutes its basic wealth. In cooperation with the United States Department of Agriculture, the P. R. R. A. has carried on an intensive program of soil conservation. At the Mayaguez, American Suppliers, and Zaldondo projects, terracing and other approved methods of soil conservation constitute an important phase of the rural rehabilitation activities. Not only are thousands of acres in process of being restored to profitable productivity but farmers, especially P. R. R. A. resettlers, are being trained and educated in the application of these new methods for the conservation and correct land utilization of their farms.

Among the activities of the agricultural development projects conducted by the P. R. R. A., the cultivation of vanilla has rapidly increased and will continue. A pilot plant to cure the vanilla beans will soon be completed at Castaner farm. It is expected that by 1942, Puerto Rico will be in a position to enter into a strong competition in the mainland markets with foreign countries now producing vanilla oils. A part of the agricultural program centers around the production of perfumes from tropical plants and trees planted in the island. These projects will within a few years establish new sources of income for Puerto Rican farmers, thereby relieving the island from depending almost exclusively on the present uncertain coffee and tobacco crops to sustain the mountainous regions.

HEALTH, SOCIAL, AND RECREATIONAL ACTIVITIES

The health division of the P. R. R. A. was eliminated on August 10, 1938, that part of its activities relating to medical care being transferred to the insular government and the social service activities transferred to the rural rehabilitation division. As of July 30, 1938, there were operating 21 rural medical centers, comprising 64 rural medical dispensaries. In the urban zone 22 public health units were constructed for the insular government in different municipalities.

In transferring the medical work to the insular government, the P. R. R. A. turned over its buildings, equipment, and trained personnel.

Aside from the contributions to the insular government's health program through the construction of health units and the transfer of its functioning rural health service, the P. R. R. A. constructed a two-story modern sanatorium in Rio Piedras. Important works are being carried on at the School of Tropical Medicine for repairs and enlargement.

Stress was laid upon the prevention and eventual eradication of malaria and of hookworm and other diseases due to intestinal parasites. Preventive work in the rural areas against typhoid fever and smallpox has been carried out on a large scale. The nutritional service was continued and strengthened in an effort to convey to the country people correct ideas on nutrition and infant feeding, enabling them better to utilize their home produce.

The health activities of the P. R. R. A. to date cover 22,060 physical examinations, 27,792 treatments for malaria, 91,550 treatments for intestinal parasites, 97,411 typhoid fever inoculations, 26,021 smallpox vaccinations, and 212,622 laboratory examinations. Of dental services, there have been carried out 48,499 oral examinations, 169,330 extractions, 10,513 prophylactic treatments, and 3,627 miscellaneous treatments. There were 23,180 clinics held and 510,435 patients attended them. Aside from the above-mentioned activities the health division rendered a very useful service through its sanitary engineering section, which was in charge of selecting of sites for the construction of rural resettlement houses and supervising the sanitary regulations to be observed.

As a part of the general work undertaken for the economic and physical reconstruction of Puerto Rico, the social-service program, previously conducted as a section of the health division and now functioning under the rural rehabilitation division, has played an important role. Social workers have been assigned to each rural medical dispensary, community center, resettlement project, and urban housing project. Community centers—some newly constructed, others made over from dismantled workers' camps or abandoned buildings—serve as activity centers for this important work.

Social work has fostered education, outdoor and indoor sports, music, drama, and other activities. Canning centers, instruction in needlework and handcraft form a part of the program of the social workers.

The encouraging of organized sports has been the most important aspect of the recreational activities carried on by the P. R. R. A., in a determined effort to foster the spirit of fair play and cooperation among the people of Puerto Rico. One hundred and thirty recreational centers have been established and were operated last year throughout the Island for the benefit of children outside of school. Organized sports and athletics have been carried on in places where they were unknown before the P. R. R. A.

SUGAR PROGRAM

Sugar is the backbone of Puerto Rico's economic life. Yet with production limited by quotas and current low prices, the industry has not been able to give its maximum employment or carry its share of the island's social problem. To point the way as to how this might be accomplished is the purpose of the P. R. R. A.'s sugar program, which is centered at Central Lafayette.

Central Lafayette—Puerto Rico's first sugar enterprise to be operated through cooperative organization—had last year the fourth largest crop in the Central's history. The yield of cane in sugar was the highest the factory ever had. Wages paid were 10 percent higher than in 1937. As a result of efficient management, and despite several unfavorable factors, total costs remained low while labor performance went up.

A total of 273,382 bags of sugar of 250 pounds each was manufactured from a crop of 266,994.53 tons of cane ground. The crop yielded 12.89 percent of sugar for every hundred pounds of cane, as against 12.65 percent for 1937. This placed Central Lafayette in first place in the island in sugar extraction and represents the efficiency with which the enterprise is being operated.

In the Lafayette district, the P. R. R. A. carried out an extensive resettlement program among the workers who will become members of the several land cooperatives. Four hundred and five concrete houses and ninety-three wooden batey houses have been constructed. A modern two-story hospital, built for the town of Arroyo but to be operated by Central Lafayette, will soon be functioning. Three community centers and three vocational second unit schools have been erected and are functioning.

Four new land cooperatives have been added to the original eight organized among the agricultural workers of Lafayette. A program to drain extensive swamp areas that now constitute a constant malaria menace is under way.

The sugar program is steadily progressing towards three definite goals: (a) To point the way towards a better distribution of profits among the laborers; (b) to eliminate exploitation of colonos; and (c) to prove that improved housing, health, and social service can be achieved without jeopardizing the profitableness of the sugar industry.

The seriousness of the sugar situation, however, is more readily recognized when it is revealed that over 100,000 acres of good cane land, capable of employing over 25,000 laborers, is now lying idle in Puerto Rico as a result of the marketing quotas. In an effort to find a way out of this dilemma, the P. R. R. A. has given considerable thought to the development of byproducts that can be made from sugarcane. A first constructive step in that direction was the administration loan to the Asociacion Azucarera Cooperativa Lafayette, the so-called mill cooperative, to build a plant at Lafayette for the manufacture of solvents, principally butyl alcohol and acetone from molasses. The distillery, having a capacity of 5,000,000 pounds of solvents annually, is under construction and will be in operation by January 1, 1939.

The cooperative division of the P. R. R. A. has steadily functioned to assist existing cooperatives and to develop new organizations where opportunities presented.

For the promotion and financing of certain types of cooperatives, the P. R. R. A. has given guidance to the Puerto Rico Self-Help Corporation, an Insular agency, which in turn organized and is supervising the Cooperative Handcrafts, Inc. of Puerto Rico and the Primus Potteries Cooperative Association.

COOPERATIVES

The Cooperative Handcrafts, Inc., of Puerto Rico is a cooperative of needle workers, who were thrown out of employment because of the vicissitudes of that industry. The membership includes nearly 600 women, employment for which varies from 150 to 600 according to the demand for silk garments and hand-made gowns. During the year, the cooperative opened a show room at 99 Madison Avenue, New York. Because of its high quality workmanship as well as distinctive styling, it has already made a place for itself in the garment industry. The effect of the Wage and Hour Law, in closing many needlework factories, will undoubtedly mean rapid expansion of this cooperative.

The Primus Potteries Cooperative is endeavoring to develop a local industry in handcraft, pottery, and tile. The project has moved slowly, due to the necessity of training workers, creating designs, and solving the many technical problems involved. It is expected that marketing will begin within a few months.

In connection with the corn growers cooperative, a corn bin and mill was constructed at Isabela by P. R. R. A. This cooperative will begin active operation with the coming crop.

Functioning under the auspices of the P. R. R. A. Cooperative Division are the Arecibo Fruit Growers Cooperative Association, the Sociedad Agricola Cooperativa Insular, and the Puerto Rico Marketing Association for Minor Crops. Dedicated to the processing and marketing of the "Sea Island" cotton as one of the new crops for the island, the last mentioned cooperative has been in operation for 3 years. Both the insular and the Federal Governments have taken important steps to aid in its development. During the past 3 years a total of 1,233 bales of cotton was marketed, and production is increasing. The cotton, being of a special long staple variety, does not compete with cotton grown on the continent.

The Arecibo Fruit Growers Cooperative Association was organized by the P. R. R. A. to aid in the rehabilitation of fruit growers in the northern zone of the island. A modern plant has been constructed and equipped for the canning of grapefruits in slices or in juice. A unit will soon be added to the plant for the canning of orange juice.

The Sociedad Agricola Cooperativa is a farmers' purchasing cooperative society also promoted and financed by the Puerto Rico Reconstruction Administration. It is a young organization, not over 10 months in existence. In this period its membership has aggregated 240 farmers. Its efficiency is demonstrated by the fact that the society has purchased for its members 10,021 tons of fertilizers at a saving from about \$15,000 to \$17,000 to its members.

The P. R. R. A. has cooperated with every private activity or enterprise intended to aid the cooperative movement in the island. Private cooperatives such as Cafeteros de Puerto Rico, the Puerto Rico Tobacco Marketing Association, and others are directly or indirectly aided by the P. R. R. A. through its division of cooperatives.

RURAL ELECTRIFICATION

During the fiscal year 1937-38 the rural electrification division of the P. R. R. A. continued its program centering around the construction activities on the Garzas and Dos Bocas hydroelectric projects.

The Garzas Dam will create a lake with an area of 150 acres, 2,415 feet above sea level. The water from the reservoir will flow from the north to the south side of the island through a tunnel 11,700 feet long, then falling through a 1,200-foot pen stock to drive two horizontal, direct-connected 5,000-horsepower over-hung impulse water wheel and generator units at Salto Garzas Plant No. 1. The estimated annual energy output of the plant will be 24,500,000 kilowatt-hours. The power generated will be transmitted to the insular government power system over six 38,000-volt circuits.

Construction progress during the fiscal year included the completion of 10 miles of all-weather access roads, an activity carried over from last year; 3,000 feet of incline railway; a diversion dam 65 feet in height; a 12-foot diameter diversion tunnel 1,200 feet long; the driving of 4,591 feet of power tunnel; the excavation of 50 percent of the main core-wall trench; and the completion of practically all the necessary camp buildings and facilities.

The Dos Bocas project is located on the Arecibo River midway between the cities of Arecibo and Utuado on the northern side of the island, where the prevailing northeast trade winds are responsible for the heavy precipitation over this area. Thus, irrigation is not a factor in the development of the project. The station will be used as a regulating medium between the total system load and power produced by the stations, the output of which is limited in accordance with irrigation requirements.

The impounding dam will create a reservoir having an area of some 600 acres, extending approximately 5 miles up the river in both directions.

The present plans call for an initial installation of two units of 8,300 horsepower and 4,150 horsepower each, with an additional 6,300-horsepower unit to be installed whenever funds are available. The estimated annual energy output of the plant will be 30,000,000 kilowatt-hours. The powerhouse is to be located immediately below the dam, the units being served through short pen stocks.

The construction program for the Dos Bocas project during the year included the completion of practically all of the construction camp buildings and facilities; construction of cofferdam No. 1; excavation of overburden on the east and west abutments and the erection and installation of most of the construction plant equipment.

An appreciable expansion of the distribution network has been effected, bringing to hundreds of rural domiciles the benefit of electrical service and thus profoundly affecting the life of these rural dwellers. It is estimated that 1,500 radios have been installed on P. R. R. A. built distribution lines within the last 2 years.

UNIVERSITY BUILDINGS

The building program in the university project for the fiscal year ending June 30, 1938, included among other features the finishing work on the auditorium. This modern structure, equipped with an up-to-date air-conditioning and ventilating system, will provide comfortable seating capacity for 2,085 persons.

The grant of additional funds for the continuation of the building program made possible the construction of a long-needed biology laboratory building for the experiment station of the University of

Puerto Rico at Rio Piedras. It is considered that this will be a valuable asset in the insular field of scientific research and agricultural advancement.

Additional funds allotted for the ensuing fiscal year will take care of the construction of the engineering building to be located on the grounds occupied by the College of Agriculture and Mechanic Arts at Mayaguez, Puerto Rico. This building will consist of classrooms, lecture halls, testing laboratories, and shops for civil, mechanical, and sugar engineering courses.

The enlargement and reconstruction of the School of Tropical Medicine at San Juan, Puerto Rico, including its adjoining hospital, is also scheduled for the coming year.

Aside from the natural growth resulting from this enlargement of its physical plant, the University of Puerto Rico may be expected to develop in the future as an international educational institution where students in South, Central, and North America will meet, thus laying the basis for a better understanding and a more comprehensive friendship between the Spanish and the English speaking people of the New World. That, undoubtedly, would greatly improve the commercial and political relations between the nations of America.

CEMENT PLANT

When the cement plant constructed at Catano, near San Juan, was completed, the P. R. R. A. had finished one of its most important industrial projects. It is a modern cement plant with a daily production capacity of 1,000 barrels, a permanent employment capacity of 150 persons or more, and a monthly pay roll of about \$20,000 in wages. On February 19, 1938, under the name Puerto Rico Cement Corporation, the insular government incorporated the plant constructed at a cost of more than \$1,400,000. The Governor of Puerto Rico was elected president of the board of directors of the new corporation on March 15. The manager was appointed on April 6, 1938.

It is expected that under insular government operation the plant will be able to produce cement at a lower price than that at which foreign cements are delivered in Puerto Rico. The Government, both insular and Federal, normally the largest consumers of cement, will use the plant's cement for its building projects. This will result in a saving on all public construction. The capacity of the plant should satisfy about one-half of the island's annual requirements.

GENERAL ENGINEERING

The engineering division of P. R. R. A. is responsible for the construction of numerous projects located throughout the island, providing better conditions of life and work for a great number of unemployed through urban and rural areas. Many of these projects already

have been completed and most of them will be completed in the near future.

Agricultural industries, public activities, and public health have been benefited by engineering projects. A building for the tobacco institute at Rio Piedras, a cotton warehouse and gin plant and a corn bin and mill at Isabela have been constructed, aiding the tobacco, cotton, and corn growers. Three new city halls and seven new police stations constructed by the P. R. R. A. have been added to the facilities of the municipal governments. Public buildings have been repaired in different municipalities of the island.

School construction and repairs represent one of the P. R. R. A.'s most commendable contributions to the cultural and educational achievements of Puerto Rico. In the urban zone, the P. R. R. A.'s engineering division has constructed 14 new school buildings and repaired 55. In the rural zone 169 buildings, comprising 309 school-rooms, have been completed. This is in addition to 11 concrete and 8 wooden second-unit or vocational schools, the latter being erected from dismantled workers' camps.

Construction and repairs in connection with waterworks have covered the laying of new pipe lines, building and repairing reservoirs and dams in 11 municipalities. Waterwork systems were constructed at Naguabo and Quebradillas and 12 deep wells for water supply have been constructed at the resettlement farms created under the Land Utilization Program. In 46 municipalities, streets have been repaired. A total of 157.6 kilometers of roads in different parts of the island were repaired.

Funds allocated by the P. R. R. A. during the fiscal year ending June 20, 1938, provided for long needed improvements to the military post of San Juan. The project is to provide better facilities and additional space for quarters for enlisted men and noncommissioned officers, laundry, garages, shops and adequate pressure and improvements to the obsolete water supply system.

The century old buildings known as the Santo Domingo barracks, the Artillery Park and the old Manicomio Building are being repaired and restored to their original appearance.

The landing pier built at Culebra for the use of the Navy has been completed. A new naval radio station building has been recently completed at San Juan.

Parks and recreational centers have been constructed by P. R. R. A. engineers in several cities with the communities contributing to the cost. A swimming pool has been constructed at Guajataca, Quebradillas; a retaining wall at Ruiz Belvis School at San Juan; a basketball court and grandstand at Yauco and an assembly hall for girls at Santurce.

At Guaynabo work was started on an entire new school and dormitories for the Boys' Orphan Asylum. In the meanwhile the asylum was moved to Cayey and temporarily placed in a camp loaned by the P. R. R. A. for this purpose.

HURRICANE STATIC RESEARCH

During the past year, the study of the relationship between radio phenomena and meteorology has continued. Puerto Rico, in the middle of the hurricane zone, must be and is vitally interested in everything related to tropical storms. The results of this investigation were reported in part in a paper entitled "The Meteorological Aspects of Certain Radio Transmission Phenomena," which was presented to the Section of Meteorology of the American Geophysical Union under the auspices of the National Research Council in Washington on April 28, 1938.

During the past year particular emphasis has been given to a study of radio static and hurricanes with a view of determining whether or not static originates in such tropical storms and, if so, whether it is of sufficient intensity and frequency to permit the development of a radio-tracking technique to supplement the classical means now employed by meteorology for the tracking of such disturbances.

This work was carried on in collaboration with investigators at the University of Florida and other stations under their control and with the National Research Council of Canada.

A further report of these joint investigations was presented on April 29, 1938, to a joint meeting of the Institute of Radio Engineers and the International Union of Scientific Radio Telegraphy in Washington (Static Emanating from Tropical Storms by S. P. Sashoff, University of Florida). In both the published papers, tracks of tropical disturbances for the 1937 season are shown. The degree of correspondence between the paths as determined by radio methods and those reported by the Weather Bureau is examined.

URBAN HOUSING

The development of that part of the urban housing program of the P. R. R. A. originally aimed for the elimination of unsafe and unsanitary housing conditions, for the provision of decent, safe, and sanitary dwellings for families of low income, and for the reduction of unemployment and the stimulation of business activity, was continued during the fiscal year ending June 30, 1938.

Inasmuch as the funds originally allotted were not sufficient to accomplish the demolition and clearance of the existing slum areas, it was deemed advisable from the beginning to apply the funds to the construction of the tenement group, project A, situated at Barrio Miranda, San Juan, and for the partial construction of the Eleanor

Roosevelt and Juan Morel Campos developments located in Hato Rey, a suburb of Rio Piedras, and Barrio Canas, Ponce, respectively. Eight hundred and eleven units were finished during the fiscal year, including the partial completion of the utilities comprised in the whole program, which ultimately is to consist of 3,004 living units.

The Eleanor Roosevelt project now contains 445 housing units; tenement group, project A, 216; and Ponce, 150 housing units. In addition to this, Mirapalmeras at San Juan and La Granja at Caguas, two developments constructed by P. W. A. through a loan obtained from the P. R. R. A., have been transferred to the P. R. R. A., thereby adding 131 and 78 housing units, respectively, to the total. Construction of all the developments mentioned has been completed during the year, and the buildings are now occupied. Rentals range from \$6 to \$12 monthly per housing unit, including some of the utilities. Besides providing decent living quarters for families of the lower income groups, the projects represent the early experimental stage incident to any large housing program and thus furnish invaluable data to be considered in connection with future housing developments in Puerto Rico.

FORESTRY

The reforestation program initiated by the forestry division of the P. R. R. A., in cooperation with the United States Forest Service and the insular forest service, has continued its field work. To date land purchased for forestry purposes has reached the total of 22,127 acres, of which 3,364 acres were acquired during the fiscal year ended June 30, 1938.

One thousand pounds of seed have been gathered from the best types of native trees and 1,200 pounds purchased and brought from Panama Canal and Haiti. As usual, the types of trees planted have been selected from among those adapted for construction, suitable for cabinet use and quick-growing for making charcoal, which is still the most common domestic fuel in Puerto Rico.

This year the production of trees from the Cayey and Mayaguez nurseries reached 3,200,000. Nine new small field nurseries were developed during the year and added to the three forest nurseries previously existing.

The planting activities covered 1,247 acres of new areas planted and 960 acres replanted. Work on weeding and maintenance of plantations was carried on in a combined area of 10,162 acres.

Eight new miles of road were added to the total mileage of road already opened in forestry lands for the improvement of communications, and 61 miles of foot and horse trails were constructed. The forestry division has constructed three concrete buildings for ranger stations and two for experiment stations.

OFFICE OF EDUCATION

J. W. Studebaker, *Commissioner*

WHEN from childhood through adult life the people of a Nation are learning through effective educational processes that the conservation of material and of human resources is necessary to the happiness of the individual and to the preservation of the desirable things of life for all, conservation in its broadest meaning is making progress.

It is that kind of progress which the Nation's schools, colleges, universities, and other educational agencies are reporting today in greater measure it seems, than in past years. It is that kind of progress which may be noted throughout the report of the Office of Education for the fiscal year that closed June 30, 1938.

GENERAL EDUCATIONAL ACTIVITIES

AN OVER-VIEW OF THE PUBLIC SCHOOLS

In the field of elementary education, even though enrollments have shown some decrease, it should be borne in mind that the elementary school provides the basic education for all children and the only education received by many.

With emphasis upon such important service has come a fuller appreciation of some of the needs in the elementary school. These include: Increased individual guidance; health and recreational services; closer cooperation between home and school; a school organization and curriculum adjustable to individual abilities and interests; and school building and equipment adequate to serve the community in its present-day wide range of activities. Efforts are being made in many school systems throughout the country to meet such needs.

The recognized social and economic losses due to first-grade failures has been the cause of recent marked increases in adjustments of promotion standards and school organization.

The formation of curriculum laboratories and divisions within State and local school systems and in colleges and universities is a comparatively recent development. Through such laboratories committee work is guided for continuous modification of teaching materials and helpful information is made available.

Enrollments

Enrollments in public schools of the United States in 1936 showed a decline for the first time. The losses were entirely in the first six grades, but they were sufficiently large to overbalance enrollment gains in high schools and in upper grades of elementary schools.

More than 6 million pupils are now enrolled in the last 4 years of public high schools. With the addition of private high-school enrollments the total exceeds 6½ million.

In addition, there are approximately 1½ million persons enrolled in night schools and in part-time schools of various kinds, and another 300,000 in Civilian Conservation Corps camps, 90 percent of whom participate to some extent in the educational program of the camps.

Adult Education

The movement to make adult education a definite responsibility of public education has made substantial progress. There was an increased interest during the year on the part of States in financing and supervising adult programs. The number of teacher-training institutions offering professional courses in adult education and the variety of courses offered increased noticeably. The activities of local organizations together with the organization of numerous regional conferences have indicated a significant interest in this field. Studies and investigations centered largely about the social aspects of adult education, the philosophy upon which it is based, and the development of instructional materials.

Guidance

The importance of including all phases of guidance in a school service provided for the adjustment of pupils has been emphasized by educational leaders during the year. The result of a superintendents' tour conducted by the National Occupational Conference for the purpose of studying guidance programs and adjustment services in some of the larger school systems, stimulated a wide interest in such service. Considerable work was done in the development of occupational information for vocational guidance and placement services.

Parent Education

A State-wide program of parent education was established in Pennsylvania under legislative enactment. This is the third State to establish a parent education program under legislative enactment. New York and California are the two other States that have such programs.

At least 36 cities now have parent education programs sponsored by their public-school systems.

Universities and colleges offered an increased number of courses and institutes in summer and in regular sessions during the year for the development of leadership in parent education and family life education.

Health Education

For purposes of safety, health, and economy a more careful selection and training of custodians for school buildings has been developing. The lines between physical education and recreation have seemed to fade somewhat. Facilities and supervision for play have been more frequently furnished. There has seemed to be a returning interest, after a half century of decline, in the adequate instruction of high-school students in the subject of hygiene.

Problems of conservation of natural resources have been considered by State departments of education in plans for curriculum revision and in preparation of teaching materials. No single practice has been followed with respect to its introduction in the school program. Elementary and high schools sometimes teach conservation in social studies or science; and some universities and teachers colleges are offering it either as a regular or a special course. The Office of Education during the year issued publications on phases of the general subject, and held a conference of educational leaders and of leaders in the conservation movement at which ways of incorporating the subject in the curriculum were discussed.

Exceptional Children

The education of children deviating from normal in mental, physical, or emotional traits continues to be a problem of vital concern. Among significant developments during the past year has been the interest on the part of State authorities in effecting State organizations to handle the problem on a sound educational basis. The education of exceptional children is closely related to elementary and secondary education for all children. It is increasingly recognized that, even while needed special provisions are important, the differences between exceptional children and so-called normal children should be minimized and the likenesses emphasized. In line with this, the Office of Education has recommended in its consultative services to States that regular elementary and secondary supervisors be given a close relationship to the program, cooperating with special supervisors of the work, or, if special supervisors are not available, taking the lead in effecting curricular adjustment for special groups. Specific services limited by law to the vocational training and placement of physically handicapped adults and young people of employable age are available from State bureaus of vocational rehabilitation. A coordinated program among all these agencies, without duplication or infringement of responsibilities, is the goal to be achieved.

Rural Education

Recent rural school developments have shown increased evidence of a more general recognition of the inadequacy of the small, local district as a unit of school administration. Numerous studies have

been made to create units of school organization through which children, even in the sparsely settled areas, can more easily be provided with modern programs of public education. Such studies have been primarily concerned with two problems: First, evolving plans for a more equitable distribution of the burdens of financing education in rural communities; and, second, organizing schools sufficiently large to insure efficient use of the personnel and equipment needed for a diversified program of public education.

Not since the early twenties have so many of the one-teacher schools been abandoned and their activities transferred to larger schools as during the past year. Comparatively few new one-teacher schools have been established. Statistics now show approximately 4,000 fewer schools of this type per year. The present success in displacing the "little red schoolhouse" with larger schools has received considerable impetus (1) from the financial aid given by the Public Works Administration to the construction of new school buildings, (2) from increased road building activities, (3) from a growing demand in rural communities for secondary education, and (4) from a clearer realization of the needs of rural people for educational opportunities equal to those provided in the cities.

Negro Education

The number of States that are appropriating funds to pay tuition and traveling expenses of Negroes to do graduate and professional work in other States when there is no opportunity to attend the university of their home States has increased. Three States have recently made provision for Negroes to do graduate study in their own States. Advancement has also been noted in the tendency to improve the salary situation among Negroes, and in curriculum studies and school reorganizations now taking place.

Growth in vocational education for Negroes is evidenced by the many requests which have reached the Office of Education from city and State school systems for information and assistance in reorganizing their programs; and by the inclusion of a discussion of the problems of vocational education for Negroes on the programs of National, State, and regional education associations.

Territories and Outlying Parts

In the Territories and insular possessions, as in continental United States, there has been considerable activity in curricular adjustment and in school organization. In Hawaii and the Canal Zone committees of teachers and supervisory officers have been at work on activity units on the elementary and secondary levels. The problem of teaching English with special reference to approved methods and to locating types of errors in order to find means by which they can be overcome, has received particular attention in Hawaii and Puerto Rico.

There has been considerable activity, especially in Puerto Rico and the Virgin Islands, in certain types of educational work (e. g., school buildings and adult education) through Federal emergency funds.

The special needs of children from foreign-speaking homes who are often underprivileged due in part to social and economic and in part to language handicaps are more clearly recognized year by year. As a result, improvement in class organization and methods of teaching is under way both in sections on the continent where there are large numbers of bilingual children and in outlying parts. A number of research studies have appeared during the year on teaching problems with bilingual children, five of which were contributed by the Office of Education through a cooperative project with universities and colleges interested in this field of work.

Financing of Schools

Financing of public education was on a better foundation in a number of States during the school year 1937-38 as a result of revisions of State school support plans made by the respective State legislatures. The idea that the State shall equalize the costs of a foundation education program became more general among the States, and, consequently, more legislation to that effect was operative during the past year than during any previous time.

OF HIGHER EDUCATION

Enrollments in a selected list of 602 approved or accredited institutions show for 1937-38 an increase of 3.6 percent over the preceding year. Assuming that this increase was true of all institutions, the total enrollment of full-time students in 1937-38 was approximately 1,300,000 and the grand total, including full-time, part-time, and summer school students was above 2,000,000. These increases, however, were only about half as great as corresponding increases for the previous similar period.

The junior college has continued to grow. In 1936-37, 528 junior colleges were reported with an enrollment of 129,106. In 1937-38, 553 were reported with an enrollment of 136,623, an increase over the preceding year of 5.8 percent. Junior colleges are primarily coeducational; 417, or 72 percent, are of this type.

The number of higher educational institutions of all classes in this country reported by the Office of Education for 1937-38 is 1,686, or 2 fewer than for the year preceding.

Professional Schools

There is little indication of change in professional schools, although increasing attention is being given to their social obligations. Important is the completion this year of the accrediting of all but 15 of the 155 degree-granting engineering schools in this country by the Engi-

neers' Council for Professional Development. This means that the engineering schools whose curricula are thus approved are considered competent to prepare engineers for the professional examinations of State Boards of Engineering Examiners which are required for license to practice in the majority of States.

The past year has seen an exceptional amount of discussion among leaders regarding the philosophy of higher education in its bearing on public service.

OF LIBRARY SERVICE

Public-school libraries have made notable progress during the past two decades and have assumed a position of importance in elementary and secondary school education. Their present status has been shown in part by a recently completed study on school library statistics for 1934-35, the first in a series which will isolate public-school library data from those of other libraries and which will build up eventually a body of comparable data.

The tabulations for this study, based on returns from half of the public-school systems, show 61,303 libraries in the 66,101 public elementary and secondary schools reporting. Of these schools, 27,836 are served by centralized libraries and 33,467 by classroom collections only. The total number of volumes in the centralized libraries is 28,346,250 and the total number of children served by them is 7,209,674, which is 57.67 percent of the pupils enrolled in the school systems reporting.

In the college library field continued attention is being paid to the problem of integrating the library with the teaching work of the college. Increasing emphasis is being placed upon the reader and the use of books rather than upon the books themselves or the technical processes involved in their handling.

With the object of improving service, a plan is being developed by the College Library Advisory Board of the American Library Association to encourage college libraries to undertake self-surveys in accordance with procedures which the Board has set up.

FEDERAL ACTIVITIES

During the year the Federal Government continued to give financial aid in support of various educational activities. Under the Bankhead-Jones Act of 1935 and the George-Deen Act of 1936 each State and Territory received larger sums for various types of vocational education for the year 1938 than for any preceding year. Allotments by the Works Progress Administration and the National Youth Administration to assist needy individuals to improve along educational lines were somewhat larger than previous allotments. Grants for school-building purposes by the Federal Emergency Administration of Public Works amounted to nearly \$50,000,000.

The Office of Education through Federal emergency grants continued four of the special projects which were in operation at the close of the preceding year. These projects were: Forum demonstrations; educational radio; local school administrative units; and a survey of vocational education and guidance of Negroes. Federal educational activities during the year also included provisions for schools by the Tennessee Valley Authority; and assistance granted by the Federal Housing Authority and other Government agencies.

ADVISORY COMMITTEE REPORT

The President's Advisory Committee on Education submitted its report to the President, February 18, 1938, in which it recommended the continuation of existing Federal grants and the initiation of new grants to the States for educational purposes to begin at \$70,000,000 in 1939-40 and to increase to \$199,000,000 in 1944-45. The grants recommended by the Advisory Committee would be divided into six major funds, namely: (1) A general aid fund for current operating and maintenance expense of public, elementary, and secondary schools; (2) a fund to improve the preparation of teachers; (3) a fund for the construction of school buildings; (4) a fund for the improved administration of State departments of education; (5) a fund for civic, general, and vocational part-time adult education activities; and (6) a fund for rural library service.

The Committee also recommended a special Federal fund for cooperative educational research, demonstration and planning, to be administered by the Office of Education. The amounts recommended are \$1,250,000 during the fiscal year 1938-39; \$2,000,000 in 1939-40; and \$3,000,000 during each of the succeeding fiscal years through 1944-45. The fund would be available for expenditure under the direction of public and private nonprofit institutions and agencies approved by the Office of Education, on the basis of cooperative projects jointly agreed upon.

RESEARCH AND INVESTIGATION

IN ELEMENTARY AND HIGH-SCHOOL FIELDS

The Office of Education recently completed its 2-year study of Local School Administrative Units in 10 States. This project whose purpose was to explore the possibilities for the organization of more satisfactory local school units—attendance, administration, and finance—was guided and coordinated by the Office of Education project staff and was financed by a grant of approximately \$864,000 of Federal emergency funds.

The project staff of each participating State—Arizona, Arkansas, California, Illinois, Kentucky, North Carolina, Ohio, Oklahoma, of the study in the State and made individual county reports giving findings and proposals for counties studied. The State reports are

Pennsylvania, and Tennessee—issued a State report on the findings available from the respective State departments of education, and many county reports are available also from these State departments.

The Office of Education project staff prepared two publications based on data submitted by the State projects, one of which describes the work of the State projects, summarizes their findings and analyzes the status of existing school units in these States, and the other of which formulates principles and procedures for prosecuting studies of local school units.

The States participating in the study have expressed their intention to make further use of the project data filed in the State department offices and to continue to study this problem. States cannot be expected in a short period of time to put fundamental changes into effect; but the study has contributed already by pointing out the necessity for changes and by indicating specifically the types of changes needed and the way in which such changes can be most satisfactorily made.

Among other studies in public-school fields made during the year by the Office of Education are the following:

(1) The purpose and amount of all Federal Government expenditures for education during the 2 years, 1936 and 1937.

(2) The study of legal provisions for public-school finance which was under way in 1937.

(3) The progress of educational legislation in the several States and in Congress. During the year the Office of Education studied such progress. A circular was issued on educational measures which shows the status of educational legislation at the close of the Seventy-fifth Congress.

(4) An analysis of public funds for education in each of seven States. This study was made in cooperation with universities.

(5) A series of study outlines inaugurated at the request of the American Association of University Women. These outlines were used to meet the needs of local branches of the Association interested in studying the public-school system. The outlines were used by many other organizations. They are being printed so as to be more widely available.

(6) The opportunities for the preparation of elementary school supervisors. This study gives information on three questions: In what colleges and universities are curricula offered for general and special subject supervisors of elementary schools? What is the content and the academic level of the curricula? and, To what extent do the curricula offered seem to meet current requirements for the preparation of such supervisors?

(7) Curriculum laboratories and divisions, their organization and functions in State departments of education, city school systems, and institutions of higher education.

(8) A survey of courses of study and other curriculum materials published since 1934. This study contains an annotated list of current courses of study.

(9) The elementary school principalship. This study describes the types of principalships, the proportion of men and women employed as principals, the organization for administration of elementary schools, and the opportunities for the preparation for this field of service. It summarizes the current practices in the certification of elementary school principals.

(10) A study of the offerings and registrations in high-school subjects 1933-34. This is a study of registrations in 206 different subjects offered in nearly 18,000 high schools reporting.

In addition to the studies noted, the Office compiled and codified for the first time the published Federal rules and regulations with respect to education. This codification is to be published in a forthcoming publication of Federal Rules and Regulations.

IN HIGHER EDUCATION

The Office has continued its study of graduate work and research during the past year. A final conference for the purpose of defining the function of the graduate school in relation to the Nation's resources, human and material, was held in June 1938 at the Johns Hopkins University under the direction of the Commissioner of Education.

Among other studies in higher education fields made by the Office during the year were the following:

(1) The economic status of college alumni of 31 colleges and universities in the United States.

(2) A study of State programs for the certification of teachers. This presents principles relative to the administration of certification and of its requirements in the several States, and suggests means whereby certification systems may be improved.

(3) Two-year terminal programs in engineering schools. These programs were studied by the Office during 1937-38 with the cooperation of the Society for the Promotion of Engineering.

(4) Relationship of State government to higher education. This long-time research project into the relationship of State government to higher education was continued during the year. Its primary purpose is to collect information and develop principles and theories that may serve as a basis for legal enactments improving the relationship of the State to higher education. During the past year another bulletin was completed dealing with the status and position of educational institutions in the scheme of State governments.

(5) Projects in aid of college students. These were studied to learn of the opportunities provided by colleges for reducing the living expenses of students and for providing work with which college students might meet a part or all of their college expenses.

(6) Leading institutions of higher education in England, the Scandinavian countries, and Paris. These institutions were studied during a field trip made by a representative of the Office of Education.

IN SPECIAL EDUCATION

Constant demands have come during the year from school officials for curriculum materials, especially in the newer fields. In an effort to meet such demands several studies were prepared dealing with approved methods of teaching and with provisions of materials. These studies are concerned with conservation as a school activity, the contribution of visual aids to school programs, and the use of school museums and school excursions as educative tools with special reference to their contribution on the elementary level.

The first step was taken during the year in the investigation of the organization of clinical facilities for the adjustment of behavior problems of school children. This is a growing development in guidance programs, and school administrators are eager for help in the organization of this service. An analysis by means of a questionnaire of existing facilities and a conference to discuss pertinent problems have paved the way for a more thorough study of the field during the coming year.

Other Research

The report on the National Survey of Vocational Education and Guidance of Negroes, conducted as an emergency relief project, was completed. Studies made in rural education problems dealt with the economic status of rural teachers, the salary and training of rural school personnel, and educational conditions in the Southern Appalachians. To promote the provision of vocational training for handicapped adolescents, an analysis was made of the extent and types of occupational experiences offered them in the day schools which they attended.

IN HEALTH AND PHYSICAL EDUCATION

An investigation of provisions for, and administration of physical education in institutions of higher education was completed and published during the year.

The study of the selection, training, duties, and supervision of school custodians in communities having a population of 2,500 or more was completed, and also the related study concerning personnel and provisions for safety and sanitation in institutions of higher education.

A circular listing sources of material for the observance of May Day as Child Health Day was prepared and published. A study in the field of curriculum construction relative to essentials and methods in health instruction is in progress.

IN MEASUREMENT

The Research in Universities Study on some factors in the adjustment of college students was completed this year. It summarizes and analyzes the research carried on in some 13 universities in an investigation of certain factors predictive of success or failure in college.

The cumulative records of 177 school systems were analyzed and suggestions for use of schools in setting up cumulative record systems were developed.

An analysis has been carried on of the methods of reporting to parents. There has been considerable experimentation taking place in this field, and any effort to aid in this problem should be of value.

Preliminary work in the use of aptitude and other measures in educational and vocational guidance has been under way. Intensive work was begun on one phase of measurement of guidance—that of interest. Preliminary plans have been made for studying new methods of

evaluation. The introduction of the objective or new-type tests has reawakened interest in the general problem of evaluation.

IN GUIDANCE AND INDUSTRIAL EDUCATION

A report of a study on the place of industrial arts in the program of education, which had been in progress for 2 years, was completed.

At the request of the International Bureau of Technical Instruction, a report on technical education in this country was prepared for the International Congress on Technical Education held at Berlin. This report is to be included in a publication by that Bureau.

IN LIBRARY SERVICE

The Library Service Division has been working on plans to secure comprehensive data on public library coverage, growth, use, and support, with a view to attacking the problem of the extension of library facilities to areas now without them.

In the field of librarianship, a study of professional library education was completed. This investigation, undertaken with the needs of the prospective library school student in mind, considered the preprofessional education required, the library school curricula, and the training and qualifications needed for the different types of professional library work.

The textual material was prepared to accompany the 1934-35 school library statistics which were based on returns from 66,101 schools in the 3,130 school systems reporting.

Work has also been in progress on school library administration and on school library legislation as well as some preliminary work on a regional library service study.

IN SCHOOL BUILDING PROBLEMS

The Office of Education completed a study of the school building situation in the United States which indicates (1) the need of continued aid from the Federal Government for school building construction and (2) the necessity for scientific long-range studies of school building needs.

This study showed that in spite of the fact that from December 1933 to December 1936 the P. W. A. allotted \$244,976,114 in grants and loans for public-school buildings, the total estimated cost of which was \$469,005,001, yet 62.3 percent of all the cities of 10,000 population and over estimated that an additional \$496,745,782 is needed for school-building construction. The main reason for this continued need is that the schools had not caught up with the lag in school-building construction during the World War.

A very different kind of building from that which was erected over 30 years ago is demanded today. School buildings must now provide not only accommodations for academic work but rooms for science, art, music, shop work, dramatics, and play, and they must be so constructed as to serve the community as well as the school pupils. Yet

39.3 percent of all school buildings in 506 cities of 10,000 population and over are more than 30 years old. Such buildings cannot serve the needs either of children, or of the youth and adults to whom the school should offer opportunities for education in new lines of work and for recreation during their leisure time.

Information in regard to the school plant in the United States is extremely meager. But few States have had the funds to make the surveys necessary to determine where new school buildings should be erected and where existing buildings should be abandoned with a view to reorganizing school districts into larger administrative units. The lack of information is serious because millions of dollars are spent, and will doubtless continue to be spent, on school building construction every year.

It seems obvious that in providing for wise expenditure of these large sums for school buildings it is necessary for each State (1) to have the facts about the present situation in regard to the school plants in both rural and urban areas; (2) to make studies of population trends with a view to estimating where buildings are needed; and (3) to plan school-building programs with a view to reorganizing the many small school districts into larger centralized districts.

IN STATISTICS

The collection, compilation and presentation of data to show the National status of education is an important function of the Office of Education. More than 35,000 schools, school systems, and institutions of higher education submit reports periodically by mail or through field contacts. Studies on which material was collected or tabulated in 1937-38 are shown in the following table, in which capital letter C stands for data collected; T, tabulated; and C-T, collected and tabulated within the year.

Subject of study, 1937-38	Type of study		
	Biennial	Periodic	Special
Federal: Expenditures for education, 1935-36 and 1936-37.....		C-T	
State school systems: Personnel and finances.....	T		
City school systems:			
Personnel and finances.....	T		
Per capita costs.....		C-T	
Per pupil expenditures by type of school and size of city:			
Free textbooks.....			T
Educational supplies.....			T
Operation of plant.....			T
Maintenance of plant.....			T
Capital outlays.....			T
Administration.....			T
Higher education:			
Personnel and finances.....	T		
Land-grant colleges.....		C-T	
Receipts and expenditures (preliminary).....		C-T	
Elementary schools: Progress and trend in passing of small rural schools.....			T
Secondary schools: Subject registrations.....		T	
Offering of rural high school by size of enrollment.....			T
Teaching staff: Economic status of rural teacher.....			T
Custodial staff: School janitor or custodian.....			C-T
Libraries: Public elementary and secondary school.....		T	
Residential schools for exceptional children: Personnel and finances.....	T		
Negro education: Personnel and finances.....		T	

IN COMPARATIVE EDUCATION

As a major piece of research and investigation for the year, the specialist in Western European education of the Office visited the Scandinavian countries, the Netherlands, and Finland to study the education of elementary and secondary school teachers and to gather official and other data relating to education in those countries. The project included a brief period in Germany, where the Terramare Office, the Ministry of Education, the University of Berlin, the Technical University, and the Amerika Institute were visited.

The study, a decennial survey of education in countries other than the United States, was completed; a manuscript on education in Germany was also completed; and a manuscript on education in Yugoslavia has been under way during the past year.

DEMONSTRATIONS AND DEVELOPMENTS

EDUCATIONAL BROADCASTING

Broadcasting activities of the Office of Education during the past year were made possible under terms of the Emergency Relief Administration Act of 1937 by an allotment of \$128,698.

"Brave New World"

The high light of the radio activities carried on by the Office during the year was the production of a series of 26 half-hour programs entitled "Brave New World." The purpose of the series was to develop appreciation and understanding on the part of our own people and to further the friendship between the United States and Latin America by offering to radio listeners an opportunity to learn of Latin-American history, culture, and present-day problems.

As an outgrowth of the emphasis placed at the Buenos Aires Conference of 1936 on the importance of international understanding, officials of the Department of State, the Pan American Union, and the Commissioner of Education laid the basis for this series of broadcasts.

The Columbia Broadcasting Co., cooperating with the Office of Education, provided a network of 102 stations—one of the largest networks ever employed in educational broadcasting. This network also contributed the services of a production director, several professional actors, and the Columbia Broadcasting System orchestra.

More than 70,000 communications from listeners and the fact that "Brave New World" was awarded first prize as an educational dramatic radio series by the Ninth Annual Institute of Education by Radio, bear testimony to the effectiveness of these broadcasts.

"The World Is Yours"

Other activities of the year included the preparation and production of "The World Is Yours," weekly broadcast in cooperation with the Smithsonian Institution, over the facilities of the National Broad-

casting Co. This series ran for 51 weeks in the fiscal year 1937-38. Through dramatizations of Smithsonian activities and exhibits, it gave the listener information and stimulated interest in the fields of history and natural science.

Other Programs

Further, the Office of Education assisted the United States Department of Commerce with the preparation and production of the weekly series, "Stories of American Industry" which were released through the facilities of the Columbia Broadcasting System.

The Office of Education also produced its regular weekly broadcast, "Education in the News" over the facilities of the National Broadcasting Co.

Good Will

An international broadcast on May 4, 1938, entitled "Calling All Countries," was jointly sponsored by the Office of Education and the American Red Cross over the National Broadcasting Co. Red Network facilities and over short-wave facilities of the General Electric Co. In this program the birth of the Junior Red Cross was dramatized in the promotion of international good will.

In addition to broadcast activities efforts were made to analyze the radio audience, to build files of late information on educational radio work throughout the United States, and to plan for the establishment of a small research section to analyze the new and various problems of radio in education.

SCRIPT EXCHANGE

Under the sponsorship of the Federal Radio Education Committee, in cooperation with the Radio Division of the Office, the Educational Radio Script Exchange was organized in October 1936 to serve as a central clearing house for radio scripts and production suggestions. By this means educational groups in various parts of the country exchange materials and experiences, and local educational organizations are helped to become sufficiently adept in radio broadcasting to enable them to secure time on the air and to do a quality of broadcasting which justifies cooperation by the local stations.

The script exchange has filled requests for more than 140,000 copies of radio scripts from schools and colleges, radio stations, civic organizations, dramatic societies, and clubs seeking practical suggestions for preparing and presenting educational radio broadcasts. These groups have received more than 16,000 copies of radio manuals, glossaries, handbooks of sound effects, and music arrangements which serve as supplementary aids to production. Only one copy of any script or production aid was sent to any given organization or person requesting material. Duplicate copies of the scripts for production purposes were prepared locally.

While hundreds of school groups have found the services of the exchange valuable in preparing mock broadcasts over public-address systems, before assemblies, or from a central control room to other schoolrooms within the school building, and have used the scripts for study purposes and as models for writing original scripts in connection with radio courses, many of the groups have produced the scripts over the facilities of their local radio stations. Since October 1936 several hundred school groups have reported the production of more than 3,000 programs based on script exchange continuities over the facilities of some 220 different radio stations located in 43 States, the District of Columbia, and several Territories and Canadian Provinces.

Through the services of the exchange a radio script can be used successfully many times after it is initially broadcast. In a very true sense, therefore, the exchange serves as an agency for the conservation and widespread utilization of creative ability. A third edition catalog describing the materials available in the script exchange was issued in May 1938.

THE FORUM PROJECT

Forum demonstrations conducted under the sponsorship of the Office were continued during the 1937-38 season in some of the smaller communities of the country. Federal funds amounting to \$260,000 were made available to the Office of Education to finance the program from November 1937 to June 1938.

The funds were used for three main purposes: (1) For the employment of a Washington staff composed of an assistant administrator, a field counselor, 3 field representatives, a senior research assistant, 3 secretaries, and 5 clerk-typists qualified by local W. P. A.; (2) for the employment of a staff of 480 relief workers assigned to communities throughout the country; and (3) for the employment of 13 forum leaders who traveled from area to area, staying from 2 to 6 weeks for each program.

Cooperative Centers

The cooperative demonstration centers, as they were named, were in 18 areas of the country. Each area served from 5 to 10 communities. The administrative centers for the various areas were: Jefferson County (Birmingham), Ala.; Phoenix, Ariz.; Pocatello, Idaho; Herrin, Ill.; Anderson, Ind.; Lexington, Ky.; Jennings, La.; Kalamazoo, Mich.; Gulfport, Miss.; Butte, Mont.; Warren County, N. J.; Somerset County, N. J.; Monmouth County, N. J.; Santa Fe, N. Mex.; Norman, Okla.; Tyrone, Pa.; Columbia (University of S. C.), S. C.; Montpelier, Vt.; Burlington, Vt.; Windsor, Vt.; Lynchburg, Va.; and Cheyenne, Wyo.

The emphasis of this program was placed on the problem of local initiative and autonomy in organizing and administering forums in smaller communities with populations ranging from approximately 1,000 to 25,000. The objective of the demonstrations was to assist local authorities to plan and administer programs where several independent school systems of limited resources might cooperate and pool their funds to provide educational forums under qualified leadership. The average population of the individual community was 9,089.

These cooperative forum programs have sought to demonstrate a practical means by which a leader may be shared by several school districts in operating a carefully planned series of forums.

Local Committees

Local advisory committees were established and usually assisted the local superintendent and board of education in selecting the subjects to be discussed. Such advisory committees made up of representative citizens also helped in promoting interest in the program.

Efforts were made to acquaint audiences with suitable reading material on public affairs; pamphlet displays were set up and bibliographies were mimeographed and distributed. Libraries were often too inadequate to meet the needs, but all possible cooperation with local librarians was established.

In the 153 communities served by the forum leaders, 1,129 regular meetings were held. The total attendance numbered 125,119, with an average for the whole program of 110 per meeting. Attendance at 806 other than regular meetings totaled 155,191.

Ten of the original nineteen demonstrations of 1936-37 were continued during the 1937-38 season with the assistance of relief workers paid from the emergency funds allocated to this Office. Such centers used leaders paid from funds made available locally or volunteer leaders. Relief workers paid by the Office also assisted some 25 new communities to carry on forum programs. From both these groups a total of 1,896 meetings were held with an attendance exceeding 155,797.

State Conferences

With assistance from the Office, State departments of education sponsored State forum conferences to promote a wider understanding of the needs for and the problems involved in the organization and operation of public forum programs. These conferences brought together educational leaders from the schools, the universities, and the community. "The purpose of these conferences was to explore the resources, interests, and objectives involved in developing adult civic education through forums" in each State. Thirty-five States held such conferences with a total attendance of 1,552 and an average of 43.

As a result of the deliberation at the conferences action taken was expressed in the following ways:

- 31 States appointed continuation committees for study and action.
- 22 States passed resolutions suggesting some definite action to advance adult civic education.
- 4 States planned adult education surveys.
- 9 States planned to set up cooperative forums.
- 6 States suggested local enabling legislation.
- 14 States suggested training courses for forum work.
- 20 States urged Federal aid.

Many significant results of these conferences can never be tabulated or analyzed. The gains made by forum demonstrations were consolidated, the progress made in each State was more adequately reported, the forum idea was still further promoted, and action for State-wide programs was more specifically planned. The real results of such a program can be measured over the years.

STIMULATING AND COORDINATING RESEARCH

THE LIBRARY

A marked increase in the use of the reading room, in circulation and in work accomplished by the staff has been noted during the first year in the new consolidated library quarters in the Department of the Interior building. For the first time in its 70 years of existence, library facilities have been adequate, and service commensurate with the distinguished collection of books has been possible. Several collections that had previously been stored because of lack of shelf space are now arranged on the shelves so as to be accessible.

During the year the education division of Harvard College Library turned over a great quantity of duplicates which have been invaluable in completing files particularly those of reports of State and city boards of education. Some 3,000 of these have been sorted and cataloged and where long runs have been completed, volumes have been bound. Consequently, this collection, so valuable for the study of the history of education, is in far better condition than it has ever been. In order that the collection may serve its fullest purpose, the current issues of board of education reports have been filed in the reading room where they may be used by anyone interested.

During the year there were 15,266 readers in the library, while during the previous year there were but 6,785. The circulation of books more than doubled.

Considerable progress has been made in organizing the collection of comparative education material. With the aid of W. P. A. workers, the bound files of the French and German periodicals were completely cataloged this past year. The greater part of the journals in the other languages are still to be cataloged.

The collection of courses of study has been arranged in a place convenient for use, and many teachers and students have had access to it. A constant check has been kept of all new courses issued and immediate application made to State and city boards of education for them.

An unusual demand has come from curriculum committees and librarians of boards of education for the loan of courses of study. As far as possible this demand has been met with duplicates which were in the collection. A plan is now projected to collect duplicates and have them available for loan outside the library.

Early in the year there was prepared in the library a list of the publications of the Office of Education covering the years 1910-36. As soon as this list was printed and distributed librarians all over the country checked their holdings and wrote for publications to complete their files. From the collection of duplicates in the library many of these requests could be granted, while the file itself has been replenished by the duplicates returned by other libraries.

By gift and by purchase many rare and out-of-print volumes have been added to the textbook collection. It is hoped that a collection of modern children's books may be developed which will show inquirers of the future, the kind of books that were read by children in the mid-twentieth century, as well as give a basis for comparison with the nineteenth century reading.

Bibliographical materials have been prepared for the series of Good References on the following subjects: Conservation Education in Secondary Schools; Conservation Education in Elementary Schools; Wildlife: Birds, Animals, Flowers; Trees and Forests; The County Superintendent and Administration of Rural Schools; Visual Education (Revised); Teaching of Music in Rural Schools; Teaching of Art in Rural Schools; Education and Social Change (Revised). Miscellaneous lists of references have been prepared upon request in many fields of activity.

COORDINATION OF STATISTICS IN LIBRARY SERVICE

The Library Service Division has participated in the preparation of uniform statistical report forms for public libraries and for the libraries in the institutions of higher education. It is hoped that the joint use of these blanks by the State library agencies, the American Library Association, and the Office of Education will facilitate the gathering of comparable and adequate library data.

COOPERATION WITH UNIVERSITIES

The Office of Education completed its publication material growing out of its cooperative research with 60 universities during the previous year. Several of the universities which cooperated in this project

are publishing additional findings and information. The studies were made possible through emergency funds.

COOPERATION WITH OTHER COUNTRIES

Requests for cooperation in making studies of education in other countries totaled 190 during the past year. Classified according to the purpose expressed, they were as follows:

Professional use.....	21
Doctoral dissertations.....	4
Masters' theses.....	5
Theses, grade not given.....	12
Reports or term papers.....	20
Study groups.....	11
Purpose not given, plainly from college students.....	33
Purpose not given, probably from college students.....	48
High-school students.....	6
Junior high school students.....	25
Elementary school students.....	2
Libraries.....	3
Total.....	190

Besides these studies carried on by correspondence, much aid was given to students from nearby institutions who came to the Office for personal direction and advice in writing papers.

UNIFORM RECORDS AND REPORTS

The Office has continued its cooperation with State departments of education in the interest of more uniform records and reports through visits to 25 States and Puerto Rico to assist in interpreting the new State school system form and revising record systems to obtain the data desired. The form for use in collecting data from public libraries was completed and preliminary work done with the American Library Association on a form for collecting data from college libraries.

POLICY FORMING

RELATIONS WITH STATE DEPARTMENTS

As a result of a resolution adopted by the National Council of Chief State School Officers, the Office inaugurated a cooperative study with that organization on the problem of accreditation of post secondary institutions by State departments of education.

The study involved a number of different phases, such as a topical analysis of the existing standards for accreditation; existing practices of State departments of education in accrediting institutions for teacher preparation and general collegiate purposes; criteria for establishing and accrediting junior colleges; accreditation of private schools of music, dramatic art, and physical education; responsibility of State departments of education for assuring satisfactory standards

in private business, trade, and commercial colleges; the part played by State departments of education in developing an adequate economical and unified system of education including higher education in the State; and the like.

The chief State school officers are cooperating with the Office in collecting factual data on the different phases of the study. It is hoped that on the basis of these data fundamental principles may be formulated and recommendations may be made that will be useful to the State departments of education in adopting satisfactory programs of accreditation.

COMMITTEES

In addition to serving on various committees which functioned within the Office, staff members have carried a wide range of responsibilities on policy forming committees outside the Office organization. Examples of agencies and groups with which such cooperation has existed are: The President's Advisory Committee on Education; National Education Association; International Committees on Open Air Schools; Technical Committee on Public Health and Safety Education, and Recreation; American Association of Health and Physical Education; National Congress of Parents and Teachers; Progressive Education Association; American Council on Education; American Red Cross; American Library Association; and many others.

FEDERAL RADIO EDUCATION COMMITTEE

Of the nine major studies reported a year ago to be undertaken by the Federal Radio Education Committee, two are under way.

One study deals with the question of evaluating radio broadcasts for schools. An examination is being made of selected programs in the more important subject-matter fields to ascertain what they are accomplishing and where they are falling short. A second phase of the study is expected to furnish guidance to teachers in selecting and using various types of school broadcast programs. Still another phase covers the development of techniques for evaluating various radio programs. This entire study is being undertaken by Ohio State University and has been financed for the first 2 years of its operation by a grant from the General Education Board. The cooperation of some 60 schools, located at strategic points in 4 different areas of the United States, and representative of rural, town, and city districts will be utilized during the progress of the study.

The second study has been initiated by Princeton University on a grant from the Rockefeller Foundation for a 2-year period. This study will involve many classifications of listeners representing various ages, different cultural and economic levels, and a wide geographic distribution of residences. It seeks to ascertain the listening habits of these different groups, what information they have secured from radio,

and what improvements or changes such listeners feel should be made. It is expected that one aspect of this study will also deal with the rather critical problem raised by organizations concerned over the influences on children of certain types of radio programs.

The remaining studies, to be supported by the broadcasting industry, are soon to be undertaken in cooperation with the Office of Education. Designed jointly by representatives of the broadcasting industry and specialists in the field of education, these studies are intended to deal with existing practical problems in this field.

It is hoped that they will indicate ways and means for working adjustments that will lead to a wide use of the facilities of radio as a teaching tool, both in the classroom and in programs of adult education.

FIELD SERVICE

CONSULTATION AND ADVISORY SERVICE

At the request of the Commissioner of Education of Puerto Rico three members of the Office staff, the chief of the statistical division, the specialist in State school administration, and the specialist in secondary education, were detailed to spend a month visiting schools in Puerto Rico, observing educational conditions there, and preparing a report for submittal to the Commissioner of Education of the island.

Upon invitation of the South Dakota State Superintendent of Public Instruction the specialist in school finance worked with the State department of education in preparing materials for the State superintendent as a basis for revising the State's plan for school support.

At the request of the Director of the School of Education, Hampton Institute, Virginia, the senior specialist in elementary education spent a week at that institute in studying its proposed program for elementary school teachers and in advising the Institute's staff with respect to the proposed program.

The senior specialist in school building problems rendered consultative services to Mount Vernon, N. Y., relative to the school building problem, and also to Rockland County, N. Y., relative to the reorganization of many small school districts in accordance with the survey recommendations made by the Office of Education the preceding year.

The Office also rendered service to the Public Works Administration, at its request, in developing standards for the construction of school buildings to replace buildings which were fire hazards. The Office reviewed 46 proposed projects for the Central Reviewing Committee of the Works Progress Administration. Fourteen members of the Office cooperated in making these reviews.

One staff member of the Office visited the Canal Zone, investigating the system of education and consulting with educational officials.

Calls for advisory service have come to the newly organized library service division from a wide range of places, no fewer than 41 different States being represented and also Alaska, the Philippines, and Puerto Rico. Among those making requests have been individual librarians, library trustees, representatives of State library agencies, officers of State education departments, citizen groups, and professional associations. Advice has been sought on such subjects as methods of organizing libraries in small towns, regional library service, State-wide library planning, library service for young people, school library legislation, school library administration, and education for librarianship.

INFORMATION SERVICE

PUBLICATIONS

A pictorial presentation of the purposes and services of the Office of Education was a unique publication of the past fiscal year. This 80-page bulletin, entitled "To Promote the Cause of Education," was first issued as the February number of *School Life*, but the edition was soon exhausted and the publication is now available as a bulletin, designated as 1938, Misc. No. 2. The nine other numbers of *School Life* issued during the year were devoted for the most part to: Presenting a bird's-eye view of important educational research and demonstrations in all educational fields, the source materials for which are available only in the Office of Education; and reporting upon activities of other Federal Government agencies.

The following table shows the total number of manuscripts and other reproduction materials that were completed for distribution during the fiscal year:

Manuscripts and Other Materials Completed During Fiscal Year 1938

Source of manuscript	Total—		Source of manuscript	Total—	
	Printed publications	Other processes		Printed publications	Other processes
Commissioner and Assistant Commissioner.....	2	1 492	Comparative Education Division.....	1	
Consultants.....	11		Editorial Division.....	4	
Higher Education Division.....	9		Radio.....	2	368
American School Systems Division.....	21		Forums.....	4	54
Statistical Division.....	5		C. C. C.....	1	32
Library.....	1		Vocational Education Division.....	8	500
Library Service Division.....	3		Grand total.....	80	1,446
Special Problems Division.....	8				

¹ Includes all regular divisions except vocational education.

The Office continued to issue a news letter, and five separate 4-page letters were sent out during the year. These letters in addition to their current information were utilized for announcements of the availability of new Office of Education publications.

DOCUMENTS DISTRIBUTED

Approximately 782,000 documents of the Office of Education were distributed during the year.

CORRESPONDENCE

The editorial division received during the year 46,666 communications in regard to publications. The incoming mail for the entire Office totaled 402,272.

EXHIBIT MATERIALS

Numerous exhibits of Office of Education publications have been developed for educational meetings throughout the country. These meetings included the National Education Association, the American Vocational Association, the American Library Association, and other major national conventions as well as State and local meetings.

Eight sets of colored stereopticon slides depicting curriculum activities and classroom equipment in nursery school, kindergarten, primary and upper elementary grades, and slides showing reproductions of report cards have been loaned during the past year in 12 States to superintendents, supervisors, principals, and instructors in teachers colleges and universities.

OTHER SERVICES

The various divisions of the Office reported more than 100 educational meetings throughout the country in which staff members officially participated. These meetings have included National, State, and local organizations. The Office's cooperation with professional and public service groups has touched practically every phase of educational interest.

Approximately 30 articles written by various staff members were published in educational journals in addition to articles written for *School Life*. Cooperation with newspapers and with other avenues for "promoting the cause of education" has been emphasized with good results during the year.

INTERNATIONAL RELATIONS

The Office of Education initiated correspondence with suitable persons and made nominations for delegates to the following meetings held the past year:

Second International Congress of the Anthropological and Ethnological Sciences, Copenhagen.

Tenth International Congress of Chemistry, Rome.

Ninth International Ornithological Congress, Rouen, France.

International Music Competition, Brussels, Belgium
Third International Congress of Phonetic Sciences, Ghent
Fourteenth International Conference on Documentation, Oxford, England.
Ibero-American Literature Congress, Mexico City.
Seventh International Conference on Public Instruction, Geneva.
Fifth International Congress for the Deaf and Dumb, Paris.
International Conference of Modern Language Professors, Paris.
International Folklore Congress, Paris.
International Congress of Aesthetics and Science of Art, Paris.
Second International Congress for the Protection of Childhood, Rome.
Fourth International Pediatric Congress, Rome.
Thirteenth International Congress of Sociology, Paris.

Representatives of the Office attended various important meetings including those of the International Bureau of Education, the Inter-American Education Conference, and others.

Considerable correspondence was carried on with the Southern Association of Colleges and Secondary Schools in regard to accrediting American schools abroad. The Southern Association which has the responsibility for accrediting schools in the extraterritorial area including Mexico, West Indies, and South and Central America, is now taking steps to accredit schools in those areas.

The diplomatic offices in Washington both assist and ask assistance of the Office of Education. During the year official calls at the embassies and legations were made as follows: Czechoslovak, 3; Dominican, 2; Egyptian, 1; Greek, 7; Hungarian, 3; Latvian, 2; Turkish, 2; Union of South Africa, 1; and Yugoslav, 2.

ADMINISTRATIVE AND SUPERVISORY ACTIVITIES

LAND-GRANT COLLEGES AND UNIVERSITIES

For the year 1937-38, Federal appropriations to land-grant colleges and universities, for instruction, increased to \$4,530,000. These appropriations were \$4,030,000 last year. For 1938-39 and thereafter they will be \$5,030,000. Until 1935 the annual continuing appropriations amounted to \$2,550,000, all of which was made available through the second Morrill Act of 1890 and the Nelson amendment of 1907—\$50,000 to each State, Alaska, Hawaii, and Puerto Rico. The expenditures of these funds are supervised by the Department of the Interior, Office of Education.

In 1935 the Bankhead-Jones Act authorized to be appropriated annually supplemental funds allocated to the States and Hawaii on a population basis increasing for 4 years until the maximum is reached for 1938-39 and thereafter. These funds are contingent upon the approval of Congress annually.

Federal land-grant endowment funds are invested by the States locally and the income only from these funds is used for current expenses in the land-grant institutions. For the year ended June 30, 1937, the endowment principal amounted to \$25,038,609 not including

588,918 acres of unsold land valued at \$4,500,000. The income of the 1862 land-grant funds was \$939,678 from invested funds and \$69,895 from rentals, rights, and deferred payments. Other Federal land-grants amount to \$11,745,043 (principal) from which nearly a half million dollars in income was derived.

The 69 land-grant colleges and universities participating in these funds were created by the 1862 Act, 1 in each State (2 in Massachusetts) primarily or exclusively for white students, and 17 Negro colleges in as many Southern States. Because these institutions are tax supported and receive more than half of their income through governmental sources, tuitions and fees which all students pay are held at a minimum "in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." About one-sixth of all students attending college in the United States register in the land-grant institutions.

The staff of these institutions numbered 24,464 men and 6,047 women in the 52 institutions for white students, and 622 men and 381 women in the 17 Negro colleges.

The total resident students in 52 institutions numbered 139,636 men and 56,579 women; in the 17 Negro colleges, 4,759 men and 5,506 women.

Of the total income of the land-grant colleges, 13 percent was derived from student fees, 3.5 percent from endowment funds, 56 percent from governmental sources, 3 percent private gifts, 6 percent sales and services, 14 percent from auxiliary enterprises, and the remainder from miscellaneous sources such as rent, interest, etc. The income was spent for the following purposes: General administration, 5 percent; resident instruction, 36 percent; organized research, 10 percent; extension service, 16 percent; libraries, 2 percent; operation and maintenance, 7 percent; a total of 76 percent for all educational and general purposes. Auxiliary enterprises and activities consumed 13 percent, noneducational expense 2 percent, and the remainder over 9 percent for capital outlays. The institutions paid 34 percent of all expenditures for administrative and instructional salaries and 13 percent for all other salaries and wages.

HOWARD UNIVERSITY

The inspection of Howard University required by law was made by the Office of Education and the report was compiled for presentation to Congress.

AMONG NEW DEVELOPMENTS

LIBRARY SERVICE DIVISION ESTABLISHED

Within the Office one new division, the Library Service Division, was organized. Its professional staff is composed of a chief of the Division, a specialist and an associate in school libraries, and a specialist in public libraries.

The functions of this new division include fact-finding, research, and experimentation in librarianship; fostering cooperation among libraries and between libraries and schools; and encouraging the further development of libraries throughout the country. The staff has proceeded along these lines in its initial efforts.

That such a division within the Office of Education will have an increasingly large area to cover is indicated by the fact that in the field of school libraries alone, 11 States now have State supervisors of school libraries and at least 13 other States have included supervisors of school libraries in their recent State plans. Twenty-one States and the District of Columbia now require certification of school librarians.

Furthermore, State appropriations for school library purposes have been greater than in the past and are stimulating efforts to raise standards, to improve the quality of personnel, of book selection, and of housing facilities. State aid has also brought about an expansion in county circulating school libraries.

The newly-organized division will seek to grow in service and to cooperate with States and local areas in their increasing efforts to make good library service available to all of the people.

CONFERENCES AND COOPERATION

Seeking information, cooperation, and helpful advice in various fields, the Office of Education during the year brought many educational leaders together in conference groups. Representative of such conferences were those devoted to the educational problems of residential schools for handicapped children; to the organization for clinical adjustment of behavior problems of school children; to problems of elementary education; and to school building problems.

The conference on educational problems of residential schools for handicapped children was a significant step in effecting a cooperative relationship between the Office and residential schools, many of which have no immediate connection with State departments of education. Administrators attending this conference urged that the Office of Education do what it can to secure the recognition of all institutions for handicapped children as schools rather than as correctional institutions. They also requested that field service and other assistance be furnished to them by the Office in the progressive development of their educational programs.

The conference on organization for clinical adjustment of behavior problems of school children was called primarily to explore some of the problems concerned with clinical organization, a study of which is under way in the Office.

The conference on problems of elementary education brought forth a discussion of the school curriculum, school organization, teacher preparation, home and public relations. The conference emphasized

the immediate need for studying the problems affecting the growth and development of children in elementary schools today.

The annual conference of the Office of Education and the National Advisory Council on School Building Problems was held in February, at which time the following research committees submitted reports of progress: National committees on (1) Developing within State Departments of Education a Division Supervising the Planning and Construction of School Plants, (2) Coordinating Relationships between State Planning Boards and State Departments of Education, (3) Uniform Methods of Reporting School Building Activities, (4) Evaluation of School Building Plans, (5) New Materials and Methods in Constructing School Buildings, (6) Federal Aid for School Buildings, (7) Minimum State School Building Requirements, and (8) School Building Costs and School Building Accounting.

Many other conferences were held throughout the year from which cooperation and specific contributions in various fields resulted.

ENCOURAGING ART

College art has been given encouragement during the year by the establishment of a college art section in the Fine Arts Gallery of the new building of the Department of the Interior.

The first exhibit in this gallery was opened to the public in November. It was an exhibition of oil paintings. Other exhibits have included architectural drawings and water colors, all the work of college students.

The gallery has been visited daily by artists and laymen. Visitors have come from practically every State and from several other countries.

MUSEUM OPENED

The Office of Education completed the basic material for its exhibit in the museum of the Department of the Interior building, and students of education and others have had access for several months to this exhibit. The various cases, 11 in all, depict progress in education throughout the United States and present both historical and current information in educational fields.

C. C. C. EDUCATIONAL ACTIVITIES

One of the major objectives of the Civilian Conservation Corps is to provide opportunities for vocational training and general education for the enrollees. Much personal development is carried on through the ordinary activities of camp life. From the regular hours, outdoor life, and good food the enrollee gains increased strength and sound habits of health and punctuality. From his daily work he gains useful skills and the knowledge that he is able to do a man's work in a man's world. From the fact that he is supporting himself and assisting his

family he gains self-respect and a sense of responsibility for those dependent on him. From association with his fellow enrollees and with the supervisory personnel he learns more of how to live among others and acquires respect for authority. Travel, contact with the forces of nature, and association with different types of people throughout the country likewise play important parts in arousing his ambition and developing his abilities.

In addition to these somewhat intangible and yet highly important values of camp life, organized educational opportunities are provided so that when the enrollees leave the Corps, they shall be more intelligent, self-supporting citizens in their home communities. These educational activities are carried on during leisure time without interference with the 40-hour work week and participation in the program is voluntary on the part of the men.

Under the plan for the educational program in the camps, the War Department is responsible for the administration of the program and its professional direction is a function of the Office of Education, which acts in an advisory capacity to the War Department. The technical services of the Departments of Interior and Agriculture assist in the program, particularly in the field of job training. Better coordination of the activities of the cooperating agencies was brought about during the past year by the reorganization of the C. C. C. Advisory Committee on Education in Washington.

GUIDANCE EMPHASIZED

Four years of experience with hundreds of thousands of C. C. C. men have assisted the camp personnel in forming a clearer concept of the type of education which is most appealing and most valuable to the camp members. In an average camp the members range in age from 17 to 23; in education, from illiterates to college graduates; in work experience, from no experience whatsoever to skilled tradesmen. Some of the men may be from farms or villages; the others of the group from small towns or large cities. In dealing with each enrollee, therefore, the program of education must be suited to his needs, interests, and abilities. These are ascertained by the educational adviser and other camp personnel through counseling with the individual men. During the past year camp officials report a total of 1,462,509 guidance interviews, or an average of 76 per company per month.

Approximately 3 percent of the men who arrive in camp are illiterate; 38 percent had not graduated from elementary school; 48 percent had not graduated from high school; and 11 percent had graduated from high school and were considered to be on the college level. Academic courses are provided for enrollees who wish to make up their school deficiencies or to secure graduation certificates. Thirty-

two percent of the men (83,029) participated in academic classes as compared with 34 percent during the previous year. Participation in these academic activities varied markedly on each educational level. Ninety-four percent of the illiterates attended literacy courses; 42 percent of those on the elementary level attended elementary courses; 28 percent of those on the high-school level attended high-school courses; and 6 percent of those on the college level attended college courses.

DIPLOMAS AWARDED

Arrangements were made by C. C. C. officials with many State and local school systems to award elementary, high-school, and college diplomas to enrollees who were able to qualify. As a consequence, during the year 3,517 enrollees received elementary school diplomas; 634 received high-school diplomas; and 13 were awarded college diplomas or degrees. Eight thousand eight hundred and seventeen illiterate enrollees were taught to read and write during the year. Moreover, in accordance with the congressional act of June 1937, 1,309 enrollees were granted leave of absence to attend schools and colleges. Forty-two colleges and universities offered more than a hundred scholarships to C. C. C. men during the year and 41 offered N. Y. A. aid and other miscellaneous types of assistance to enrollees desiring to attend college.

Vocational training is considered one of the major objectives of the program and 49 percent of the educational activities are classified as having vocational objectives. There are some 60 major types of work in which the C. C. C. is engaged, which may be broken down into more than 300 jobs for training purposes. Instruction on the job is combined with courses in related subjects during leisure time. During the year 54 percent of the men were receiving training of this kind in the jobs they performed while in camp as compared with 50 percent during the previous year. In addition to these job training activities, 41 percent of the men participated in other prevocational courses, which were provided in the camps or in nearby trade schools.

There is a variety of other educational activities carried on in the camps. For example, all camps give instruction in health, first aid, and safety. Officers, foremen, enrollees, and other instructors in many camps attend teacher-training, foreman-training, and leader-training courses. In the camp libraries there are now available more than 1,647,719 books. During the year 68,693 educational films were shown. Seventy-one percent of the companies publish a camp newspaper. During an average month about 8,500 lectures are delivered in the camps. Correspondence courses are provided either free or at reduced rates, and during an average month more than 16,000 enrollees take such courses.

An unusual feature of the program is the emphasis placed on the informal type of educational activities such as the arts, crafts, dramatics, music, hobbies, and debating and discussion groups. During an average month about 42,000 men (16 percent) engaged in these activities. Since participation in the educational program is voluntary, it must be made not only worth while but as interesting as possible.

C. C. C. officials have continued to assist the men in finding employment and adjusting themselves to their home community when they leave camp. This is done by providing courses in occupations and job-getting techniques and by counseling with individual men. In cooperation with other agencies, C. C. C. officials have assisted in organizing State guidance and placement councils. These State councils in turn have fostered the development of local community councils. In many States a referral card is sent to the local Employment Service office when enrollees return home. During the fiscal year 48,327 men were discharged from the corps to accept employment.

In summarizing the participation of the enrollees in the educational program, it may be stated that the average number of enrollees of the corps was 263,906 and the average regular attendance in organized educational activities was 229,253, or 86.9 percent. Figures computed from the monthly camp reports indicate that the average enrollee who participated in the program spent 5.8 hours per week in his educational activities as compared with 3.6 hours per week during the previous fiscal year.

During the year funds were authorized to provide space for educational purposes. Many companies constructed school buildings with 2,600 square feet of floor space. In other camps due to the fact that adequate space had already been provided or because enrollees were using the facilities of local schools, smaller buildings were constructed. A report from 8 of the 9 corps areas indicates that 842 camps now own motion-picture projectors and that all but 2 corps areas and district headquarters have established a film library service with suitable educational films.

The teaching staff in the C. C. C. educational program is drawn largely from the personnel of each camp. For example, during an average month of the year there were 23,168 persons teaching in the camps. Of this number 1,537 were educational advisers; 3,033 were Army officers; 9,895 were members of the technical services; 5,767 were enrollees; 1,344 were W. P. A. instructors; 123 were N. Y. A. students; 781 were teachers from the State and local school systems; and 688 were citizens of nearby communities.

Most of these instructors have a practical knowledge of the subjects they teach but some of them lack professional teaching techniques. Teacher training therefore has been carried on in many camps.

Through the cooperation of the vocational divisions of the State Departments of Education, teacher-training programs were conducted in all the camps of Massachusetts, Georgia, Michigan, and Wisconsin during the past year.

COOPERATION KEYNOTE

It is the policy of the corps to utilize whatever educational facilities are available in the States and local communities. The Works Progress Administration made available an average of 1,344 instructors per month and the National Youth Administration an additional 123. The State departments of education and local schools and colleges provided 781 instructors. The vocational divisions of the State departments of education in 20 States have assigned vocational instructors to the camps or have aided local schools in making their facilities available to enrollees.

Forty-seven colleges and universities offer correspondence courses to enrollees at reduced rates and an average of 16,164 men take these courses each month. Hundreds of schools and colleges have placed their facilities at the services of the enrollees and during the school year more than 6,500 enrollees attended schools and colleges adjacent to the camps. One State, Montana, has designated each C. C. C. camp as a technical high school for the accrediting of vocational training and related work.

The key to the development of the Civilian Conservation Corps thus far has been genuine cooperation. Its success has been due to a considerable extent to the teamwork of four departments of the Federal Government—Labor, War, Interior, and Agriculture. Its educational progress has been due not only to the work of these agencies but also to the cooperation of State, local, and private educational organizations, groups and individuals.

VOCATIONAL EDUCATION

The activities of the Office of Education in the fields of vocational education and vocational rehabilitation are carried on in pursuance of its responsibility for the administration of the following Federal acts:

The Vocational Education Act (Smith-Hughes), to provide for cooperation with the States in the promotion of vocational education. (Approved Feb. 23, 1917).

The Vocational Rehabilitation Act (Smith-Bankhead), to provide for the promotion of vocational rehabilitation of persons disabled in industry or otherwise, and their return to employment. (Approved June 2, 1920, as amended June 5, 1924, June 9, 1930, and June 30, 1932.)

An act extending the benefits of the Vocational Education and Vocational Rehabilitation Acts to the Territory of Hawaii. (Approved Mar. 10, 1924.)

An act to provide for vocational rehabilitation of disabled residents of the District of Columbia. (Approved Feb. 23, 1929.)

An act extending the benefits of the Vocational Education and Vocational Rehabilitation Acts to the Island of Puerto Rico. (Approved Mar. 3, 1931.)

An act (Social Security Act) authorizing additional appropriations for 1936 and 1937 and an annual appropriation thereafter for cooperation with the States and Hawaii in extending and strengthening their programs of vocational rehabilitation of the physically disabled. (Approved Aug. 14, 1935.)

An act (George-Deen) to provide for the further development of vocational education in the several States and Territories, authorizing for the year 1937-38 and annually thereafter, additional appropriations for vocational education in agriculture, trades and industries, home economics and the distributive occupations—and for teacher training in each of these fields. (Approved June 8, 1936.)

An act (Randolph-Sheppard) authorizing the operation of vending stands in Federal buildings by blind persons. (Approved June 30, 1936.)

Under these acts, the Office of Education cooperates with the public education systems in the States in promoting vocational education in agriculture, the trades and industries, home economics, and business education and in rehabilitating for self-supporting employment, persons who are disabled through accident, illness, or congenital causes.

The actual work of providing vocational education is carried on by the States, either directly through State boards for vocational education, or by the State board in cooperation with local cities and towns. Each State initiates and operates its own program. The Office operates no schools and employs no teachers or rehabilitation workers. The Office is administratively responsible for insuring the use of Federal funds for the purposes as set forth in the Federal legislation. Through its technical staff the Office of Education assists the States in the promotion and development of vocational education and vocational rehabilitation. The Office also conducts researches and studies and issues publications designed to assist those engaged in the vocational education and vocational rehabilitation programs in the States.

Before presenting in detail the principal activities of the Office of Education in the field of vocational education it may be well to enumerate some of the high lights of the vocational education and vocational rehabilitation programs which have emerged as a result of another year of effort. The factor which perhaps has had the greatest single influence upon and has given the greatest impetus to the vocational education program during the year has been the additional funds provided under the George-Deen Act, which was passed June 8, 1936, and which became operative July 1, 1937.

The acceptance of the act by the 48 States, the District of Columbia, and Puerto Rico, has placed additional responsibility upon the Office of Education. Staff members have been called upon to assist the States in drawing up plans covering the use of funds provided by the act and in putting into operation new types of training programs authorized by the act. Expansion under the act has taken place not only as an expansion of the program already in operation, but also as an extension of the program into areas which heretofore have not been able to support such a program. In two fields, moreover, public

service occupations and the distributive occupations, for which training is provided under the George-Deen Act, it has been necessary for the States to set up entirely new programs. Setting up a program of training for workers in the distributive occupations has been difficult because few of the States had previously carried on any activity in this field; and also because there were few trained persons who could be used immediately for supervisory and teaching services.

Evidence that vocational education programs are not being conducted on any hit-or-miss basis is to be found in the increasing demand for vocational education surveys in cities, districts, counties, and States. Office of Education staff members have in numerous instances been called upon to conduct or plan such surveys.

Special attention has been directed by the Office of Education during the year to assisting State boards for vocational education in setting up or modifying courses for prospective teachers of vocational education. There is a definite tendency in the States to lay greater emphasis on teacher-training programs. The increase in the number of prospective teachers enrolled in teacher-preparatory courses, and of teachers already in service enrolled for professional-improvement training, indicates that the attention given teacher-training programs is more than justified.

Encouraging is the tendency on the part of those responsible for vocational education programs in the States to broaden the scope of these programs so that they will include not merely training, but also the making of local surveys to determine the needs for specific programs and the opportunities open to those who pursue courses under this program; the placing of graduates from these courses; and following these graduates up in their employment and encouraging them to return to part-time classes for occupational improvement training.

ADVISORY BOARDS AND COMMITTEES

The value of advisory committees in setting up and operating programs of vocational education, particularly in the field of trade and industry, was recognized by the Federal Board for Vocational Education when it inaugurated the program of vocational education under Federal grants, in 1917.

The outline set up by the Office of Education to be followed by the States in formulating their plans for vocational education programs under Federal grants for the 5-year period, 1937-42, provides for the appointment of representative State Advisory Committees.

These State committees are of two types: (1) Committees designed to assist the State board for vocational education in the formulation of policies and to render a technical consulting service in connection with programs in all phases of vocational education; and (2) committees representing each of the major fields of vocational education, trade and industry, home economics, agriculture, and the distributive occu-

pations fields. A survey recently made by the Office of Education discloses that 21 States have general State advisory committees.

Thirty-nine States have set up advisory committees in the field of trade and industry. These trade and industrial advisory committees are composed of employers and workers. In addition a number of States have set up advisory committees for portions of a State, for counties, or for local communities.

Those committees in the field of trade and industry are usually of three general types: (1) The general advisory committee; (2) the industrial advisory committee; and (3) the craft advisory committee.

It has been found that committees are very helpful in advising on such training problems as: (1) The need for training in various fields of industry and the probable number to be served; (2) the type of training for journeymen, apprentices, or new workers; (3) the content of training courses; (4) the qualifications of instructors; (5) the plant and equipment needed; (6) plans for apprentice training; (7) giving the public a clear understanding of the training program; and (8) securing cooperation in the training program with the various agencies interested in vocational education for workers.

There has been a marked increase in the number of advisory committees in the field of trade and industry during recent years and this increase has been especially noticeable in the past year. The Office of Education follows as far as possible this practice of soliciting the assistance of committee groups in its administrative problems.

In June 1938, for instance, the Commissioner of Education called together in Washington a conference group composed of a State superintendent of schools, State directors of vocational education, State supervisors of distributive education, and representatives of the Department of Commerce, the retail trade, labor, and the field of business education.

This group rendered valuable service to the Office in setting up qualifications for State supervisors, teacher trainers, and teachers in the field of distributive education; in formulating a teacher-training program to be followed in that field; and in indicating the nature of a vocational education program for workers in this field.

Twenty-four States provide in their State plans for vocational education covering the period 1937-42 for a State home economics advisory committee to be set up at any time the need for such a committee arises.

The advisory committee idea has been put into operation by the States in the field of vocational rehabilitation through the organization of what is known as the State vocational rehabilitation council. This council is composed of the chief supervisory officer in each State and territory. It has an executive committee of nine members which is available to the Office of Education for advisory purposes.

STATE PLANS

Considerable attention has been given by the Office of Education during the year to assisting State boards for vocational education in formulating State plans for vocational education and vocational rehabilitation for the 5-year period, 1937-42. In some instances entirely new plans were prepared by the States. In many cases, however, the Office of Education was asked to approve an extension of old plans pending the preparation of new ones based upon changes in legislation and in economic and social conditions.

Although the general conditions applying to the use of Federal funds have remained the same since the passage of the Smith-Hughes Act in 1917, some new standards and types of vocational training were introduced by the passage of the George-Deen Act. It has been necessary for the States to take these new factors into consideration in setting up new plans.

Past experience in training programs in the field of trade and industrial education has shown that the best results are secured when training objectives are clearly defined and working objectives are carefully established. This fact as well as the realization on the part of the States of the necessity for setting up definite standards and safeguards for the various forms of trade and industrial education have caused them to proceed slowly and painstakingly in setting up their new 5-year plans.

The plans for trade and industrial education have taken into account particularly: Higher standards for teachers; training for public service occupations; maintenance of adequate safeguards in connection with plans for cooperative training to prevent charges that vocational training is being employed as "a device for utilizing the services of vocational trainees for private profit"; cooperative efforts to promote apprenticeship and to organize related training for apprentices; local supervision of training programs; and coordination of the training given in classes with actual work in industry.

The provisions embodied in the 5-year plans for the promotion of agricultural education by the States show that the additional funds provided for this phase of vocational education under the George-Deen Act are to be used to expand and strengthen programs already in existence and to initiate programs in new centers and new fields of activity. In using these funds, particular attention will be given to programs of training for farm youth who have left school and are not yet established in any type of profitable farming.

State plans for programs of home economics education submitted to the Office of Education have placed particular stress upon the development of State programs of research; summer employment for teachers to enable them to supervise home projects; State and local advisory committees in home economics education; and the introduc-

tion of apprentice teaching into home economics teacher-training courses.

The fiscal year marked the inauguration of programs of training in part-time and evening classes for those engaged in the distributive occupations. State plans covering this field of vocational education and which would serve as a basis for initiating the distributive education program were approved by the Office of Education for 1 year only.

On the basis of the first year's experience these 1-year plans have been or are now being revised to provide, among other things, for State supervision of distributive education programs, preemployment and in-service training for teachers of distributive occupations courses, and part-time and evening classes for distributive workers. A significant feature of all State plans is the requirement that supervisors, teacher trainers, and teachers shall have had successful experience in the distributive occupations they are employed to teach, and that the class instruction offered shall be supplemental to and based upon the job activities of the worker.

Regional rehabilitation agents of the Office of Education have rendered extensive service to State rehabilitation division staffs in preparing and providing for improvements in their 5-year plans for administration of rehabilitation programs. A number of States have made changes in their plans based upon the findings of surveys of vocational rehabilitation programs made by the Office of Education in cooperation with State rehabilitation divisions during the past 3 years.

ENROLLMENTS INCREASED

The enrollment for the year ended June 30, 1937, in vocational schools organized under State plans, in agriculture, trade and industry, home economics, and the distributive occupations was 1,506,824, which was 125,123 greater than the enrollment for the preceding year. Indications are that the record for the fiscal year just closed will reveal a sizable increase in enrollments over 1937.

Preliminary estimates indicate that more than 1,000 new all-day vocational agriculture departments were established in public high schools during the year ended June 30, 1938; that approximately 50,000 out-of-school farm youth were receiving instruction in part-time classes; and that 150,000 adult farmers were enrolled in evening classes.

A definite improvement is noticeable, also, in the type and scope of the instruction in agricultural education. Increased emphasis has been placed upon supervised farm practice, required of every person enrolling for a course in vocational agriculture, which is worked out on a comprehensive long-time basis and is based on the problems and conditions facing the individual student.

Although there has been a gradual growth in the enrollment in trade classes for several years, the principal increases during the past year have taken place in classes organized for training in public service occupations and those organized for employed workers, especially apprentices.

In conformance with the terms of the George-Deen Act, practically all of the States have been initiating during the year a training program for workers in the distributive occupations. Instead of seeking to organize numerous classes with a large enrollment, however, State boards for vocational education have been giving major attention to the development of a sound and constructive training program.

Classes have been organized for store workers, managers, and owners. The instruction in these classes has emphasized sound management policies for owners and executives of distributive businesses and a knowledge of merchandise and efficient customer service for store workers.

Distributive workers and executives are already recognizing the value of this training to the producer, the distributor, and the consumer. State and national associations are cooperating in the development of the program. With the present impetus it is expected that a carefully conceived and well-developed program will be put in operation in all the States during the current fiscal year.

During the former fiscal year 11,091 disabled persons were rehabilitated; that is, restored as far as possible physically and placed in self-supporting employment; and it is expected that the number for 1938 will be larger.

Small as is the percentage increase in the number rehabilitated each year under the Federal-State cooperative program of rehabilitation, it represents a significant accomplishment in view of the facts: (1) That vocational rehabilitation must be done on an individual rather than on a mass basis, and (2) that employment conditions have been so stringent that even many able-bodied persons have experienced difficulty in securing employment.

Rehabilitation programs are now in operation in 46 States, the District of Columbia, Puerto Rico, and Hawaii. A total of 326 persons is employed on the staffs of State rehabilitation services and rehabilitation offices are maintained in 169 cities.

COOPERATIVE SERVICES

Cooperative services to the States is a principal function of the Office of Education in the field of vocational education. In addition to the more or less routine service involved in auditing State vocational education and vocational rehabilitation expenditures of Federal monies, inspecting vocational schools and classes, and conferring with State vocational education officials on administrative problems, members of the staff of the Office render many other services.

They cooperate in planning and setting up training courses for prospective vocational education teachers; assist in local, district, and State surveys and investigations on the need for vocational education programs; assist in planning and improving curricula in different fields of vocational education; plan and have charge of annual State and regional conferences for directors, supervisors, coordinators, and teacher trainers and other vocational education and vocational rehabilitation workers; participate in institutes and courses for teachers of vocational education; assist in activities in behalf of the blind; assist in training rehabilitation case workers; and assist in various activities carried on by emergency and recovery organizations.

IN AGRICULTURAL EDUCATION

The agricultural education service of the Office of Education has devoted considerable time during the year to assisting State directors of vocational education and State supervisors of agricultural education in formulating their 5-year plans for vocational education in agriculture so that they would be in keeping with the vocational education acts and the policies of the Office of Education.

Regional conferences for State supervisors and teacher trainers in agricultural education have been held in each of the four regions. In addition a conference for State supervisors and Negro teacher trainers from the 18 States which maintain separate schools for this race, was held in Washington, D. C. State and district conferences also have been held for teachers and supervisors of agriculture in the various States.

Special attention has been directed to the promotion and improvement of programs of vocational education in agriculture for out-of-school farm youth and adults. This phase of vocational agriculture was stressed in 39 district conferences for teachers of vocational agriculture from 12 States; in summer sessions attended by teachers of agriculture where short, intensive courses dealing with problems of part-time and evening school instruction have been discussed; and in State conferences for vocational agriculture teachers. Approximately 1,500 teachers have been reached through these various services.

Expansion of the program of vocational agriculture into many rural communities has created an unusual demand for qualified teachers. Teacher-training institutions have been encouraged to adjust their programs to meet this demand, with the result that in practically all of the States the teachers needed to staff new departments and to replace persons leaving the field of vocational teaching are being prepared. At the request of State vocational officials and colleges, surveys have been made or assistance given by Office of Education representatives in connection with specific teacher-training problems.

The Office of Education continued to sponsor the activities of the Future Farmers of America—the national organization of boys studying vocational agriculture in the rural high schools. At the close of the year there were 5,000 local chapters of this organization in 47 States, Hawaii, and Puerto Rico, with a total membership of approximately 160,000.

Counterpart of the Future Farmers of America is the organization for Negro vocational agriculture students known as the New Farmers of America, or the N. F. A., which has a membership of more than 12,000 in 340 chapters. Through the Office of Education the new N. F. A. Guide was published and made available during the year to members of this organization.

IN TRADE AND INDUSTRIAL EDUCATION

Nine outstanding services to the States are reported by the trade and industrial education service of the Office for the past year. Representatives of the service assisted in or made surveys of school districts, cities, counties, or States designed to ascertain the possibilities for trade and industrial education. They made studies of single trades or groups of trades or of industries to discover the needs for organized vocational training in these trades. They made studies of vocational schools and classes to evaluate specific features of the work being done and to discover ways of improving it; and conducted or assisted in conducting training courses for trade and industrial teachers, supervisors, and coordinators of trade and industrial education.

State conferences were held by staff members of the Office of Education for teachers, supervisors, and coordinators of trade and industrial education as well as training conferences for foremen and executives of industrial plants, and training courses for foremen conference leaders. Continuing its practice of previous years, the Office has made analyses of the training content of a number of additional trades. Finally, representatives of the Office of Education have conferred with executive officers and State directors of vocational education from time to time during the year on special problems arising in the promotion of vocational education programs.

IN HOME ECONOMICS EDUCATION

Special attention has been given by the home economics service of the Office of Education in its program of cooperation with the States, to long-time planning for the further development and strengthening of home economics education. Emphasis has been placed on this type of planning not only in the annual regional conferences but in four intraregional conferences of supervisors and teacher trainers in home economics education.

Among specific services rendered by the home economics education service are included: Assistance in State conferences of home eco-

nomics teachers in 7 States; teaching short units of instruction on special problems in summer schools for home economics teachers conducted in 6 institutions; cooperating with State supervisors of home economics education in making studies of teacher education programs in 15 institutions; directing a 5-week training program for itinerant teacher trainers for Negro schools; guiding curriculum studies in education for home and family life in 16 States; assisting in setting-up programs of research in home economics education in 9 States; and assistance to supervisors of home economics in several cities in developing broadened programs in family life education.

IN BUSINESS EDUCATION

In the main, the cooperative services of the Office of Education to the States in the field of business education have consisted of assistance in the formulation and revision of State plans covering training for the distributive occupations; and in the preparation of instructional material for distributive workers who are members of organized classes.

As examples of the type of services rendered to groups in the States in the field of business education may be mentioned assistance to the chairman of a committee on commercial education curriculum for small rural high schools in one State; counsel and suggestions given to a State official in another State on the formulation of a curriculum for a part-time program of training in the retail field; and assistance to the chairman of a curriculum committee in a third State on the revision of curricula for business education in the high schools of the State.

IN REHABILITATION

Throughout the year four regional and two special agents of the Vocational Rehabilitation Division of the Office of Education were engaged in rendering a varied type of service to State boards for vocational education and their representatives. These services included assistance in: (1) training new personnel, (2) planning better procedures for handling rehabilitation cases, (3) developing more effective administrative organizations, (4) improving cooperative working relations with private agencies and other State agencies, and (5) making surveys of State programs of vocational rehabilitation and formulating recommendations for improvement in these programs, based upon the survey findings.

COOPERATION WITH OTHER AGENCIES

In its role as administrator of the vocational education acts the Office of Education endeavors to cooperate in every way possible not only with State boards for vocational education, but also with other Government agencies; with trade and professional and other groups;

and with individuals interested in agricultural, trade and industrial, home economics, and business education.

This cooperation has taken various forms. It has included cooperation in planning vocational and special courses; in preparing publications on various subjects for use by workers in the field of vocational education and vocational rehabilitation; in preparing and presenting radio programs; in convention and conference activities; in research activities; and in providing services supplementary to those available through the vocational education and vocational rehabilitation programs.

During the past year, the Office has definitely cooperated with at least seven different United States bureaus or divisions.

It has cooperated with the Agricultural Adjustment Administration in the preparation of subject matter on the activities of that organization for the use of supervisors, teacher trainers, and teachers of vocational agriculture in explaining these activities to farm youth and adult farmers; and in providing for discussion of the agricultural adjustment program by representatives of the Agricultural Adjustment Administration, at conferences of agricultural teachers.

Early in 1938, a committee consisting of educators in the fields of agriculture and home economics, was appointed by the Commissioner of Education to formulate a cooperative agreement between the Office of Education and the Extension Service of the Department of Agriculture, under which both bureaus might render greater service to farm people. This inter-departmental group is at work on this agreement which will cover relationships between those engaged in agricultural and home economics extension work and those engaged in agricultural and home economics education in the various States.

The agricultural service of the Office of Education assisted during the year in working out with the Soil Conservation Service of the Department of Agriculture, suggested subject-matter material for the use of agricultural teachers in giving instruction in soil conservation. This cooperation has resulted also in the setting up of a definite plan for cooperation in two North Central States between the Soil Conservation Service and agricultural supervisors and teachers.

As a result of the cooperation in various ways between the Office of Education and the Farm Credit Administration, many agricultural students and adult farmers have secured loans to assist them in becoming established in farming. The Office has also cooperated with the Farm Credit Administration in preparing publications on farm credit for the use of vocational agriculture teachers.

Through the joint cooperation of State supervisors of agricultural education and State directors of the National Youth Administration, special types of part-time classes in vocational agriculture for out-of-school farm boys have been held at colleges of agriculture in two

western States; special farm shops have been erected and equipped; and where facilities were available for 6 months of supervised practice in farming, a teacher of vocational agriculture has been provided to teach part-time classes.

In a number of instances, new school buildings provided through the Works Progress Administration have included housing space for departments of vocational agriculture.

The Office of Education has cooperated, also, in the program of the Civilian Conservation Corps, as explained specifically in a previous section of this report, as well as with the Rural Electrification Administration and the Farm Security Administration.

Assistance was given the Federal Bureau of Investigation of the Department of Justice by a member of the Office of Education staff in organizing and conducting training groups of men selected from State and local police departments in law-enforcement activities, so that they may be able to instruct other officers in their State or local police departments.

Special analyses were made by a representative of the Office of Education of the jobs performed by stewards, bakers, cooks, and custodial officers in Federal prisons, to be used by the Federal Bureau of Prisons as a basis for training courses for these groups of employees.

Cooperating with the Navy Department, the Office of Education has completed preliminary work involved in setting up an in-service training program for the Department's civilian employees, and in training younger employees in the drafting department of one of the principal Navy yards.

Plans are being formulated by the Office for setting up a training course for field employees of a number of bureaus of the Department of Agriculture.

The Office of Education has cooperated with the Federal Fire Council in inspection and interdepartmental activities; with the Social Security Board in its employee-training activities; with the Works Progress Administration in trade analysis and foreman conference work; with the Council of Personnel Administration through an interchange of informative material; and with the International Association of Fire Chiefs in training work for fire fighters.

Cooperative work with other agencies in the field of home economics education has included: A joint study with the home economics extension service of the Department of Agriculture on the present status and needs for home economics education in two selected counties; assistance to the Interdepartmental Committee of the Federal Government in coordinating health and welfare activities; participation in conferences having a bearing on home economics education sponsored by the Children's Bureau, Department of Labor, American Home Economics Association, American Vocational Asso-

ciation, National Congress of Parents and Teachers, National Council of Parent Education, National Education Association, Association of Southern Agricultural Workers, National Consumer-Retailer Relations Council, and National Committee on Household Employment; and cooperation in various ways with the Farm Credit Administration, Federal Housing Administration, National Youth Administration, Tennessee Valley Authority, Rural Electrification Administration, and Works Progress Administration.

Cooperation with Government and other agencies in the field of business education has consisted of furnishing information to trade associations relating to the program of distributive education authorized by the George-Deen Act. Included in the organizations to which such information has been given are: American Retail Federation, National Retail Dry Goods Association, Retail Druggists' Association, Industrial Retail Stores, Bureau of Foreign and Domestic Commerce of the Department of Commerce, and the Consumer Distribution Corporation. Advice and assistance have been given to regional and national associations of business educators in planning convention and conference programs and in the preparation of publications.

Various Federal acts having to do with vocational rehabilitation either directly or indirectly require cooperation between State rehabilitation and other departments such as workmen's compensation, public employment, and crippled children's agencies. Much of the time of Federal rehabilitation agents during the year was devoted to promoting effective working relationships among such departments.

Ever since the Civilian Conservation Corps was organized, the Office of Education has rendered assistance in the program of education for C. C. C. enrollees. This assistance has continued throughout the past year.

APPRENTICE TRAINING

As increased attention is given by employers and by workers to the development of apprenticeship, the special functions of vocational education are more clearly recognized.

Two distinct groups of responsibilities and functions in the promotion and operation of plans for apprentice training are recognized by the Office of Education and the Department of Labor.

One group of responsibilities has to do with the apprentice as an employed worker—the conditions under which he works, his hours of work, his pay rates, the length of his learning period, and the ratio of apprentices to journeymen maintained for the purpose of avoiding overcrowding or shortage of skilled workers in the trades. These responsibilities, the Office of Education and the United States Department of Labor agree should be carried by State labor departments whose function it is to improve working conditions and foster the well-being of workers.

The second of the two groups of responsibilities and functions has to do with the instructional phases of apprenticeship. Included in this category are: Analyses of trades for the purpose of learning the training content; planning of courses to meet the needs of workers; organization of related subjects classes; training teachers for such classes; and any other functions involved in giving the apprentice technical and supplemental instruction needed to make him a proficient worker and to coordinate his instruction and his job experience. These educational functions, the Office of Education and the Department of Labor believe belong to those who are responsible for vocational education in the States.

In a number of States, special supervisors of apprentice education have been appointed and many representative advisory committees have been organized. In all cases, the school administration and the members of State advisory committees in trade and industrial education are urged to cooperate with the United States Department of Labor and State labor departments in upholding labor standards.

Special attention has been given by the Office of Education in cooperation with the States to the preparation of instructional material which may be used in apprentice classes.

RESEARCH ACTIVITIES

The research program of the Office of Education in the various fields of vocational education has been extended during the year.

Among the subjects on which studies have been made are the following: Agricultural experiment station data and their use in vocational agriculture classes; supervised farm practice; occupations of out-of-school farm youth; potential departments of vocational agriculture; factors influencing the establishment in farming of former vocational agriculture students; teacher-training programs in agriculture; cooperative study with American Vocational Association of vocational education needs in Williamsport, Pa.; size of program for agricultural education in various regions; salaries of vocational agriculture teachers, 1936-37; vocational training for sheet metal workers in the aviation industry; household service workers' training courses; apprenticeship in the plumbing trades; training for fire fighters in Connecticut; training programs for plasterers, machinists, and bricklayers; teacher training in the field of trade and industrial education; membership and functions of representative trade and industrial advisory committees; training for police service; training for public service occupations; employment status of trade school graduates; aeronautic engineering courses; studies and research in home economics and home economics education in colleges and universities; training needed by research workers in home economics; methods of teaching home economics; educational programs in home and family living at high-school and college levels; source units in housing and

household management in secondary school programs; responsibilities of household employees for which training is needed; teaching of textile and clothing courses in high schools and implications for the college program; administration of State vocational rehabilitation programs; rating system for the evaluation of case work in rehabilitation; mental, achievement, aptitude, interest, and other tests for use in rehabilitation case work; analysis of data on rehabilitated cases.

Besides carrying on its own program of research in vocational education and vocational rehabilitation, the Office of Education has through its staff members rendered considerable assistance to the States in setting up programs of research. In addition, requests for assistance in research activities in States where special research workers have been employed have been met by aiding research groups in each State to study the local needs for research with special consideration for their national implications; helping set up plans for a long-time program of research in the State; and evaluating accomplishments during the first year in order that plans covering the next steps in the research program in the State may be appropriately revised.

Limited personnel has prevented the carrying on of a comprehensive research program in the field of business education. Data were collected on curriculum building in business education, including distributive education, teacher training, State and local supervision; and on distributive occupations. Assistance has been given to research workers in the States carrying on studies in curriculum revision, teacher training, occupational surveys, job analysis, and methods of teaching business subjects.

NEW DEVELOPMENTS

The completion of the first year of the operation of the George-Deen Act has served to emphasize some of the new developments as well as the outstanding needs of the vocational education program.

One of the principal developments made possible by the provisions of the act was the organization of training on a much broader basis than had hitherto been possible for persons already employed in public-service occupations.

Another development made possible is the wider use of local supervision of vocational education programs, particularly in training on the job of teachers of trade and industrial education, drawn from industry.

By reason of the fact that it authorizes the payment of travel expenses of advisory committee members, also, the George-Deen law has made possible more effective utilization of advisory committees, especially in the field of trade and industrial education.

A significant increase in the number of all-day, part-time, and evening schools has been made possible through the additional funds.

In the field of agricultural education the act made possible the employment of an increased number of teachers on a full-time basis. As a result a greater number of these teachers are able to give their time exclusively to agricultural instruction and to include in their activities the organization and teaching of part-time classes for out-of-school youth and evening classes for adult farmers, instead of being required to prorate their time between agriculture and other subjects taught in the high school. This has encouraged the raising of standards in agricultural teacher-training institutions.

The vocational training programs for distributive workers represent one of the significant developments in the field of vocational education during the year. The year's record indicates that there is widespread interest in this type of vocational education and that the possibilities for expanding the training program are almost unlimited.

There is an imperative need for occupational surveys, follow-up studies, and revision of business curricula based on the findings of research. Business teacher-training curricula in colleges and universities need to be revised in accordance with modern requirements.

APPROPRIATIONS: 1938 AND 1939

The total amount appropriated for administering the vocational education program carried on under the Smith-Hughes and George-Deen Acts for the year ending June 30, 1938, was \$425,000. The appropriation for the fiscal year ended June 30, 1939, for this purpose is in the same amount.

The appropriation for administering the Federal vocational rehabilitation acts was increased from \$95,000 for the fiscal year ended June 30, 1938, to \$104,650 for the year ending June 30, 1939.

The Smith-Hughes Act appropriates \$7,167,000 annually for allotment to the States for cooperative vocational education in agriculture, trades, and industries, and teacher training. The total amount authorized by the George-Deen Act to be appropriated annually for vocational education is \$14,483,000. An appropriation of the full authorization was made for the fiscal year 1938. An amount of \$12,500,000 was appropriated for 1939 with the provision that the allotments to the States shall be computed on the basis of the total amount authorized in the act. Appropriations for vocational education in Hawaii and Puerto Rico are continued for 1939 in the same amounts appropriated to these territories in 1938—\$30,000 and \$105,000, respectively.

The Federal appropriation to the States for vocational rehabilitation under the Smith-Bankhead Act of 1920, as amended, for each of the years ending June 30, 1938, and June 30, 1939, was \$1,800,000, with the provision that the allotments to the States shall be computed on the basis of the total amount authorized in the act. The appropriations for vocational rehabilitation for Hawaii, Puerto Rico, and the

District of Columbia, \$5,000, \$15,000, and \$25,000, respectively, for 1939 are the same as those for 1938.

The acts authorizing appropriations for allotment to the States for vocational education and rehabilitation provide that unexpended balances remaining in the States at the close of a fiscal year shall be deducted from the allotments to those States for the ensuing year. As already indicated, appropriations made in consideration of the unexpended balances provide that the allotments to the States shall be made on the basis of the total amounts authorized in the acts.

Appropriations for allotment to the States and Territories are shown in table I, total allotments to the States and Territories for vocational education in table II, and allotments for vocational rehabilitation in table III.

TABLE 1.—Appropriations for Allotment to the States and Territories for Vocational Education and Vocational Rehabilitation, 1938, 1939

Act	Appropriation	
	Fiscal year ended June 1938	Fiscal year ending June 1939
VOCATIONAL EDUCATION		
Smith Hughes Act:		
Total.....	¹ \$7,167,000	¹ \$7,167,000
Vocational agriculture.....	3,027,000	3,027,000
Vocational trade, industry, and home economics.....	3,050,000	3,050,000
Vocational teacher training.....	1,090,000	1,090,000
George-Deen Act:		
Total.....	14,483,000	² 12,500,000
Vocational agriculture.....	4,067,200	3,529,300
Vocational trade and industry.....	4,058,975	3,503,200
Vocational home economics.....	4,018,825	3,494,500
Distributive occupations.....	1,254,000	954,000
Vocational teacher training.....	1,051,000	1,019,000
An act making appropriations for the Territory of Hawaii:		
Total.....	30,000	30,000
Vocational agriculture.....	10,000	10,000
Vocational trade, industry, and home economics.....	10,000	10,000
Vocational teacher training.....	10,000	10,000
An act making appropriations for the Island of Puerto Rico:		
Total.....	105,000	105,000
Vocational agriculture.....	30,000	30,000
Vocational trade and industry.....	30,000	30,000
Vocational home economics.....	30,000	30,000
Vocational teacher training.....	15,000	15,000
VOCATIONAL REHABILITATION		
Vocational Rehabilitation Act.....	³ 1,800,000	³ 1,800,000
Hawaii.....	5,000	5,000
Puerto Rico.....	15,000	15,000
District of Columbia.....	25,000	25,000
Total vocational rehabilitation.....	1,845,000	1,845,000
Total vocational education and vocational rehabilitation.....	23,630,000	21,647,000

¹ Permanent and continuing appropriation. Estimated expenditure, \$7,000,000.

² Allotments to States made on basis of \$14,483,000 as authorized in the act.

³ Allotments to States made on basis of \$1,938,000 as authorized in the act.

TABLE 2.—Allotments of Federal Money to the States and Territories for Vocational Education, Year Ending June 30, 1939

State or Territory	Smith-Hughes Act (appropriated)				George-Deen Act (authorized to be appropriated)				
	Total	Vocational agricultural education	Vocational trade, industrial, home-economics education	Vocational teacher training	Total	Vocational agricultural education	Vocational trade, industrial, home-economics education	Vocational education for distributive occupations	Vocational teacher training
Total.....	\$7,157,977.62	\$3,018,853.83	\$3,049,265.27	\$1,089,858.52	\$14,483,000.00	\$4,067,200.00	\$4,058,975.00	\$1,254,000.00	\$1,054,000.00
Alabama.....	160,268.82	106,018.23	32,611.15	21,639.44	401,144.05	165,947.24	55,072.91	24,429.46	19,837.46
Arizona.....	35,926.19	15,926.19	10,000.00	10,000.00	80,408.60	20,000.00	20,000.00	10,000.00	10,000.00
Arkansas.....	113,969.95	82,028.87	16,776.23	15,164.85	305,740.84	138,607.14	30,995.77	17,120.09	13,902.02
California.....	313,266.41	84,540.06	182,301.17	46,425.18	493,375.58	76,828.34	213,243.77	52,410.87	42,559.21
Colorado.....	61,536.56	28,757.35	22,779.21	10,000.00	123,622.04	35,018.40	31,752.56	10,000.00	10,000.00
Connecticut.....	89,214.52	26,484.45	49,589.77	13,140.30	144,923.17	20,000.00	64,104.14	14,834.50	12,046.06
Delaware.....	30,000.00	10,000.00	10,000.00	10,000.00	180,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Florida.....	84,785.54	39,488.86	33,290.52	12,006.16	139,855.59	34,542.21	50,149.93	13,554.13	11,066.36
Georgia.....	175,228.68	112,207.67	39,236.98	23,784.03	430,909.73	175,634.20	62,833.09	26,850.55	21,893.46
Idaho.....	37,587.72	17,587.72	10,000.00	16,000.00	85,860.29	23,322.53	20,000.00	10,000.00	10,000.00
Illinois.....	420,534.11	111,199.48	246,935.68	62,398.95	673,513.00	123,722.64	279,646.92	142,496.48	57,202.79
Indiana.....	185,584.34	80,412.77	78,689.02	26,482.55	360,165.48	100,662.97	102,283.38	103,044.87	29,897.00
Iowa.....	146,260.73	83,146.09	42,908.77	20,205.87	330,105.47	121,080.05	62,961.33	22,811.05	18,523.26
Kansas.....	111,527.42	64,167.24	31,978.49	15,381.69	250,754.04	87,561.92	49,459.38	17,364.88	14,000.13
Kentucky.....	157,592.30	101,201.53	35,010.22	21,380.55	379,737.33	145,672.06	60,643.33	12,684.62	14,100.81
Louisiana.....	124,390.87	70,683.15	36,522.14	17,185.58	282,172.30	102,842.00	53,597.61	19,401.35	15,754.48
Maine.....	50,615.30	26,528.15	14,087.15	10,000.00	101,582.84	21,171.85	26,416.52	10,000.00	10,000.00
Maryland.....	92,639.43	36,602.80	42,714.98	13,341.65	162,385.90	29,400.76	58,788.05	15,061.81	12,230.65
Massachusetts.....	225,930.31	23,310.27	167,878.22	34,750.82	294,908.15	20,000.00	174,008.92	39,231.31	31,837.00
Michigan.....	270,137.03	85,855.27	144,684.11	39,597.65	459,102.70	96,872.60	171,207.64	44,703.06	36,360.23
Minnesota.....	148,887.03	72,816.70	55,103.85	20,966.48	317,424.54	110,858.26	70,365.18	23,669.73	19,220.53
Mississippi.....	124,424.02	93,141.81	14,847.09	20,966.48	349,001.51	168,741.26	27,283.12	18,554.13	15,066.51
Missouri.....	209,813.81	98,675.62	81,459.38	20,678.81	431,203.86	137,990.54	106,052.83	33,505.35	27,207.35
Montana.....	39,875.61	19,875.61	10,000.00	10,000.00	90,801.51	25,331.93	20,000.00	10,000.00	10,000.00
Nebraska.....	82,280.54	49,713.06	21,299.32	11,268.16	192,684.27	72,518.94	33,409.76	12,720.99	10,329.82
Nevada.....	30,000.00	10,000.00	10,000.00	10,000.00	80,000.00	20,000.00	20,000.00	10,000.00	10,000.00
New Hampshire.....	32,679.49	10,714.23	11,965.25	10,000.00	80,000.00	20,000.00	20,000.00	10,000.00	10,000.00
New Jersey.....	218,495.63	39,135.29	146,312.71	33,047.63	302,649.11	20,000.00	164,895.07	37,308.52	30,295.64
New Mexico.....	37,642.12	17,042.12	10,000.00	10,000.00	82,607.48	20,000.00	20,000.00	10,000.00	10,000.00
New York.....	679,136.35	115,167.53	461,031.10	102,937.72	947,775.59	89,138.46	500,480.36	147,581.33	94,365.76
North Carolina.....	192,981.96	131,572.98	35,484.35	25,924.63	485,954.01	198,094.85	66,222.13	108,604.08	23,765.80
North Dakota.....	51,635.26	10,000.00	10,000.00	10,000.00	129,730.19	49,191.21	20,000.00	10,000.00	10,000.00

* The allotments to Hawaii and Puerto Rico are not included in the totals under the Smith-Hughes Act.

* The sum of \$12,500,000 was appropriated for the fiscal year 1939, with the proviso that the allotment to the States and Territories be made on the basis of \$14,483,000, the full amount authorized.

TABLE 2.—Allotments of Federal Money to the States and Territories for Vocational Education, Year Ending June 30, 1939—Continued

State or Territory	Smith-Hughes Act (appropriated)				George-Deen Act (authorized to be appropriated)					
	Total	Vocational agricultural education	Vocational trade, industrial, and home-economics education	Vocational teacher training	Total	Vocational agricultural education	Vocational trade, industrial, and home-economics education	Vocational home-economics education	Vocational education for distributive occupations	Vocational teacher training
Ohio.....	\$371,096.69	\$119,248.45	\$197,495.50	\$54,352.74	\$327,015.40	\$125,453.59	\$237,563.83	\$152,810.82	\$61,360.55	\$49,826.61
Oklahoma.....	143,352.81	87,756.55	36,002.87	19,593.39	337,188.90	126,795.87	57,856.10	112,455.55	22,119.60	17,961.78
Oregon.....	57,324.88	25,866.11	21,458.77	10,000.00	111,628.76	27,693.47	30,789.18	33,146.11	10,000.00	10,000.00
Pennsylvania.....	537,709.58	172,677.04	286,273.09	78,759.45	858,491.92	106,072.11	370,028.00	221,276.85	38,914.06	72,200.90
Rhode Island.....	47,842.03	10,000.00	27,842.03	10,000.00	88,296.97	20,000.00	28,296.97	20,000.00	10,000.00	10,000.00
South Carolina.....	106,714.19	76,236.31	16,259.29	14,218.59	274,928.97	113,473.43	34,675.21	97,692.95	16,051.82	13,034.56
South Dakota.....	51,323.28	31,323.28	10,000.00	10,000.00	128,452.67	48,313.48	20,000.00	40,139.19	10,000.00	10,000.00
Tennessee.....	156,555.22	95,875.76	39,282.82	21,396.64	376,206.74	150,491.95	59,084.68	122,859.89	24,155.35	19,614.87
Texas.....	343,814.26	191,491.24	104,391.96	47,631.06	780,504.42	291,248.04	146,433.22	245,386.28	53,772.22	43,694.66
Utah.....	35,132.76	13,466.11	11,666.65	10,000.00	80,900.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Vermont.....	33,424.97	13,424.97	10,000.00	10,000.00	80,000.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Virginia.....	145,433.63	91,209.99	34,419.18	19,804.46	337,148.87	117,731.58	62,036.16	116,880.97	22,357.89	18,155.27
Washington.....	89,381.85	37,840.26	38,757.07	12,784.52	165,452.09	37,731.20	53,077.76	48,490.36	14,432.86	11,719.91
West Virginia.....	104,667.06	68,990.85	21,535.80	14,140.41	226,923.60	55,607.33	53,981.55	88,408.27	15,963.56	12,962.89
Wisconsin.....	169,327.35	77,210.55	68,053.37	24,033.44	343,977.87	109,088.25	86,784.01	98,941.39	27,132.12	22,032.10
Wyoming.....	30,000.00	10,000.00	10,000.00	10,000.00	80,000.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Alaska.....	-----	-----	-----	-----	80,000.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
District of Columbia.....	-----	-----	-----	-----	80,512.97	20,000.00	20,512.97	20,000.00	10,000.00	10,000.00
Hawaii.....	-----	-----	-----	-----	80,020.99	20,020.99	20,000.00	20,000.00	10,000.00	10,000.00
Puerto Rico.....	-----	-----	-----	-----	254,271.99	126,739.41	21,941.06	79,764.66	14,253.00	11,573.86

TABLE 3.—Allotments of Federal Money to the States and Territories for Vocational Rehabilitation, Fiscal Years Ending June 30, 1938 and 1939

State or Territory	1939	State or Territory	1939
Total.....	\$1,938,000.00	Nevada.....	\$10,000.00
Alabama.....	40,912.77	New Hampshire.....	10,000.00
Arizona.....	10,000.00	New Jersey.....	62,481.73
Arkansas.....	28,671.54	New Mexico.....	10,000.00
California.....	87,774.11	New York.....	194,619.94
Colorado.....	16,014.92	North Carolina.....	49,014.59
Connecticut.....	24,843.80	North Dakota.....	10,526.32
Delaware.....	10,000.09	Ohio.....	102,762.39
Florida.....	22,699.53	Oklahoma.....	37,044.38
Georgia.....	44,967.45	Oregon.....	14,746.17
Idaho.....	10,000.00	Pennsylvania.....	148,907.13
Illinois.....	117,975.03	Rhode Island.....	10,629.16
Indiana.....	50,069.43	South Carolina.....	26,882.47
Iowa.....	38,202.37	South Dakota.....	10,711.91
Kansas.....	29,081.51	Tennessee.....	40,453.71
Kentucky.....	40,423.30	Texas.....	90,054.00
Louisiana.....	32,492.04	Utah.....	10,000.00
Maine.....	12,328.69	Vermont.....	10,000.00
Maryland.....	25,224.49	Virginia.....	37,443.44
Massachusetts.....	65,701.88	Washington.....	24,171.15
Michigan.....	71,865.59	West Virginia.....	26,734.67
Minnesota.....	39,640.43	Wisconsin.....	45,439.00
Mississippi.....	31,073.18	Wyoming.....	10,000.00
Missouri.....	56,112.45	Hawaii.....	10,000.00
Montana.....	10,000.00	District of Columbia.....	25,000.00
Nebraska.....	21,304.23	Puerto Rico.....	15,000.00

¹ A special allotment of \$5,000 to Hawaii and the allotments to the District of Columbia and the island of Puerto Rico are not included in the total.

OFFICE OF EDUCATION PUBLICATIONS, 1937-38

GENERAL EDUCATION

Bulletins 1937

No.

2. Volume I: Biennial survey of education, 1934-36.

Chapter

III. Higher education, 1930-1936.

IV. Adult education.

VI. Effects of the depression upon public elementary and secondary schools and upon colleges and universities.

VII. A survey of a decennium of education in countries other than the United States.

VIII. A review of educational legislation, 1935 and 1936.

X. Development in educational method, 1934-36.

2. Volume II:

Chapter

II. Statistics of State school systems, 1935-36.

III. Statistics of city school systems, 1935-36.

IV. Statistics of higher education, 1935-36.

V. Statistics of public-school libraries, 1934-35.

VI. Statistics of special schools and classes for exceptional children.

3. Public affairs pamphlets. Supplement 1.

9. College salaries, 1936.

10. Economic status of college alumni.

11. College student mortality.

12. Some factors in the adjustment of college students.

13. Economic status of rural teachers.

14. Successful practices in teaching English to bilingual children in Hawaii.

No.

15. Learning English incidentally: A study of bilingual children.
16. Student interests and needs in hygiene.
18. Preparation for elementary school supervision.
19. CCC camp education: Guidance and recreational phases.
20. Education and the Civil Service in New York City.
21. University unit costs.
23. Professional library education.
24. Continuity of college attendance.
25. Forums for young people.
26. Education in the southern mountains.
27. Printed page and the public platform.
28. Needed research in secondary education.
30. Occupational experiences for handicapped adolescents in day schools.
31. A survey of courses of study and other curriculum materials published since 1934.

Preprint of Part IV. A classified list of courses of study, 1934-1937.

32. Let Freedom Ring! 13 scripts.
33. Let Freedom Ring! Manuel.
34. Industrial arts—Its interpretation in American schools.
35. School building situation and needs.
36. Guidance bibliography: 1935.
37. Guidance bibliography: 1936.
38. Vocational education and guidance of Negroes.

Bulletins 1938

1. Educational directory, 1938.
 - Part
 - I. State and county school officers.
 - II. City school officers.
 - III. Colleges and universities.
 - IV. Educational associations and directories.
2. The school custodian.
3. Nature and use of cumulative records.
4. School use of visual aids.
5. Bibliography of research studies in education, 1936-37.
6. Offerings and registrations in high-school subjects, 1933-34.
7. Curriculum laboratories and divisions.
8. The elementary school principalship.
9. College projects for aiding students.
10. Local school unit organization in 10 States.
11. Principles and procedures in the organization of satisfactory local school units.
12. Development of State programs for the certification of teachers.

Miscellany

1. Choosing our way.
2. To promote the cause of education.

Pamphlets

79. Legislative plans for financing public education.
81. Per capita costs in city school systems, 1936-37.
82. Physical education in institutions of higher education.
83. Handbook for compiling age-grade progress statistics.
84. Safety and sanitation in institutions of higher education.
85. Salary and education of rural school personnel—status and trends.

Leaflets

No.

30. Federal aid for education, 1935-36 and 1936-37.
31. Government publications useful to geography teachers.
32. Personnel and financial statistics of school organizations serving rural children, 1933-34.
33. The housing and equipment of school libraries.

Bibliographies

24. Transportation of pupils at public expense. Revised.
27. Consolidation of schools and reorganization of school administrative units. Revised.
28. Education and social change. Revised.
32. Visual aids in education: Motion pictures. Revised.
54. Supervised correspondence study in high schools.
55. Conservation education in secondary schools.
56. Educating for international understanding.
57. The county superintendent and the administration of rural schools.
70. Conservation education in elementary schools.
71. Conservation of trees and forests, for use in elementary schools.
72. Conservation of birds, animals, and wild flowers, for use in elementary schools.

VOCATIONAL EDUCATION**Agricultural Education**

- Bulletin No. 189. Landscaping the farmstead—Making the farm home grounds more attractive.
- Bulletin No. 196. Farm forestry—Organized teaching material. Timber farming including woods management and forest tree planting.
- Leaflet No. 2. Suggestions for teaching the job of controlling bunt (stinking smut) of wheat in vocational agriculture classes. Revised.

Home Economics Education

- Bulletin No. 194. The duties and responsibilities of the general household employee. Some bases for determining content for vocational courses in household employment.
- Bulletin No. 195. Homemaking education programs for adults. A guide in the development of adult education in home economics.

Trade and Industrial Education

- Bulletin No. 192. Training for the public-service occupations.
- Bulletin No. 193. Training for the painting and decorating trade.

Vocational Rehabilitation

- Bulletin No. 113. Administration of vocational rehabilitation. Revised.

General

- Digest of annual reports of State boards for vocational education to the Office of Education, Vocational Division, fiscal year ended June 30, 1937.

RECOMMENDATIONS

On the previous pages is given an account of the work done by the Office of Education. What is left undone by the Office, what the rich possibilities for additional services are, stand out in my mind

in contrast with the relatively meager, although I trust effective, services now being rendered. I wish, therefore, to include in these recommendations brief statements of what I think the Office of Education should be equipped to do which it cannot now do.

I. SERVICES CALLING FOR FEDERAL LEGISLATION.

A. THE PRESIDENT'S ADVISORY COMMITTEE ON EDUCATION.

This committee submitted a report in March, 1938. That report analyzes admirably the general problem of the Federal relations to education. With the spirit and the general findings of that report, I am in agreement. It recognizes an expanding responsibility of the Federal Government in the field of education. It selects the areas of education in which the Federal Government should participate and sets forth the reasons why the development of each of these areas is a matter of national concern.

The committee recommends that the Office of Education should have large responsibility for the administration of the proposed laws. Therefore, it is appropriate to name these important areas of education and to summarize in a few words the reasons why legislation, framed in accordance with the most satisfactory formulas for Federal-State relations that can be evolved and designed to carry out the Advisory Committee's general purposes, should be passed.

1. *Federal equalization fund.*—The equalization of educational opportunity among the States for elementary and secondary school pupils should no longer be neglected. Equality of opportunity is the most basic tenet of democracy. Furthermore, national welfare demands that the weaker schools be strengthened. A low standard of education in one community affects adversely all communities.

2. *Teacher training.*—No school program can be strong unless the teachers are well trained. Therefore, the Federal Government, when it contributes funds for education in the States, must take steps to assure highly trained teachers for the schools.

3. *School buildings to assist in meeting the expense of better district organization.*—Schools have been established in many States under the small district system. Small school districts were well adapted to earlier years, in fact they were necessary then, but today they are inefficient and often too expensive. The most common feature in this district system is a small and unsatisfactory building in each district. In many cases the perpetuation of an outworn district organization plan is due to the expense involved in providing modern school buildings and facilities. Therefore, the Federal Government can materially assist in remedying the existing situation by stimulating a school building program that will enable many communities to bring about an efficient scheme of district organization.

4. *Assistance to State departments of education.*—With the passing years, more and more responsibility for an effective system of educa-

tion in the several States is falling upon State departments of education. The planning of courses of study, the certification of teachers, and many other responsibilities which were formerly carried by the local districts, are now handled by State departments of education. An increasingly large share of the funds for the support of schools is being collected and distributed on a State rather than on a local district basis.

Many State departments are not adequately equipped to administer their already heavy duties. If Federal funds are made available to the States it is important that provision also be made to assist State departments of education in carrying their ever-enlarging responsibilities.

5. *Bridging the gap between school and job.*—The responsibility of the public for the welfare and training of a youth does not end when he chooses to leave the public school. A prolonged gap between school and job may nullify much of the good which accrues from attending school. The public should continue its interest in a young person at least until he is placed in a suitable occupation where he can be self-sustaining.

Therefore, to organize and coordinate all educational services available for young people in each community, so that each youth will be guided into the type of activity best suited to him, is an urgent public duty. This service for youth is bound to be intimately related to organized education. The administration of the program should be integrated with the administration of education.

6. *Adult education.*—Nearly half the adult population of today never completed the elementary school. Furthermore, with the rapidly increasing complexity of social life, even an adequate education in one's youth no longer suffices for adult life. An adult education program is among the most urgently needed safeguards of democracy. The Federal Government should help to stimulate it.

7. *Rural library service.*—Rural people in general are out of reach of the public libraries which serve (although only partially) the urban population. But because of their greater isolation from social opportunities, rural people are in at least as great need of library service as are urban people. Therefore, the Federal Government may properly stimulate the States to develop a library service which reaches the rural population.

8. *Education of children living on Government property.*—There are at the present time some thousands of children living in Federal areas scattered throughout the country who do not have educational opportunities, or who secure them through the payment of tuition. The parents of these children are in most cases Federal employees who are assigned to live in these territories.

In recent years the number and types of federally owned or controlled reservations have greatly increased, thus removing taxable wealth from local school districts. In some cases no school facilities exist. In others the existing local facilities are entirely inadequate to care for the increased numbers of children who move into the territory by reason of the newly developed Federal activity. Year after year these thousands of children continue without educational opportunities. It is exceedingly important that as soon as possible the Federal Government establish some policy which will guarantee adequate educational opportunities for the children who must reside on these Federal properties.

9. *Educational research, planning, and leadership.*—In countries having strongly centralized governments, education is a function of those governments. Large authority resides in the ministries of education. Changes in the programs of the schools and colleges can be effected quickly by edicts issued by those ministries. In the United States the opposite system prevails and should be continued. Education is a function of the several States and local communities. The Federal Government has little authority. Coordination of programs among the States is accomplished by voluntary counsel and cooperation. Under these conditions, change usually takes place slowly. A long time often elapses before the best practices of one locality or State are accepted in other localities or States.

While such a system is relatively safe against partisanship propaganda, it lacks the machinery to keep education abreast of other social and economic movements, especially those movements motivated by profits. A democracy, if it is to be successful in its competition with strong centralized governments, must provide itself with machinery to facilitate the social changes which depend upon voluntary acceptance by the people. The mainspring of that machinery is a research program adequate to discover and verify better educational policies and practices year after year. Well organized demonstrations involve phases of practical research which may be of far-reaching significance.

Operating with the research program must be adequate facilities for counselling and planning in order to assure the most economical and effective utilization of the results of research.

These two functions, research and planning, together with promotion of an understanding of the findings of the former and of the purposes and results of planning and demonstrations respectively, are the primary purposes of the Office of Education. If the Office can be adequately equipped to perform these functions, the United States need not concentrate in the Federal Government administrative control of education in the States, and yet we may be assured of quicker adjustments of the educational systems to the needs of the times.

B. OTHER FEDERAL LEGISLATION NEEDED.

1. *Public forums*.—A special aspect of adult education which demands consideration at this time, is the forum for the discussion of current social, economic, and political questions. Democracy can rise no higher than the level of the public opinion of its voters. To enlighten that public opinion is a necessary safeguard of democracy.

The present agricultural, industrial and social programs of the Federal and State Governments, together with many other issues of common concern, involve policies which demand wide information and free discussion. A vital method of spreading accurate information among adults is the public forum, controlled by the local public educational agencies. Experience gained during the past 3 years with forum demonstrations carried on in many communities in 40 States and sponsored by the Office of Education with emergency funds, has demonstrated not only their effectiveness, but their freedom from partisan bias. Provision should now be made for extending these experimental forum centers more widely throughout the States by the use of regular funds instead of relief funds.

There should be appropriated a sum, which need not be very large in comparison with other Federal grants in aid to the States, from which each State would receive an allotment for each of 3 years on a basis of matching which would be readily acceptable to the States and local communities. It is estimated that such a 3-year program in grants in aid as suggested would create an adult civic education enterprise within each State under local management involving in all States approximately 500 full-time forum leaders or their equivalent. That number of leaders would be capable of conducting almost 100,000 public forums per year in addition to giving many other types of assistance to local programs of civic education for adults. Such an investment would make public discussion of the crucial problems of democracy sufficiently general and vital to the life of our people that the principles and procedures of democratic discussion would simultaneously become effective safeguards of the democratic processes over all parts of the Nation. The principles and procedures of democratic discussion and fair examination of controversial issues would influence general public education and would serve to promote a surer foundation for the further development of democracy through our present 3 billion dollar expenditure for education. At the conclusion of the 3-year period consideration should be given to the desirable next steps to be taken.

This proposal suggests a way by which the vital sources of democratic power may be nurtured by the application of the educative processes to local public opinion formulation. The forum is, therefore, not merely a desirable advance to make in the field of public education but it is also in the nature of a national necessity made so by the

burdens now being heaped upon public opinion by modern social and economic problems. It is recommended as a basic means of making democracy work and as a practical method of preventing the development of any potential tendencies toward dictatorship.

2. *Physically handicapped children.*—Because of the special facilities needed, one of the most expensive phases of education in any local community is the proper education of physically handicapped children. On this account and also because the number of children so handicapped in any community is, in proportion to the total school population, relatively small, there is totally inadequate provision in many States and communities for the education of these children.

The Government has made provision for the physical and educational rehabilitation of disabled adults. Under the Social Security Act, provision is also made for the physical rehabilitation of crippled children. Thus far no Federal assistance has been provided for the education of physically handicapped children. Legislation should, therefore, be passed that will provide the social security for handicapped children which is possible only through their proper education. The Federal Government should, through grants-in-aid to the States, stimulate a Nation-wide development of educational opportunities for physically handicapped children.

II. SERVICES WHICH CALL FOR ADDITIONAL APPROPRIATIONS TO THE OFFICE OF EDUCATION BUT WHICH DO NOT REQUIRE FEDERAL LEGISLATION.

Many of the services suggested above under "Research, Planning, and Leadership" could be rendered without new Federal legislation if the Office were adequately staffed for the purpose. Some of the more urgent needs for such additional services will be briefly mentioned below.

A. TO PROMOTE BETTER GENERAL EDUCATION THROUGHOUT THE STATES.

There are many ways in which the Office of Education is called upon to help the States in their efforts to provide general education. Among these are the following:

1. *General curriculum problems.*—One of the most difficult and important problems involved in the proper development of education is to be found in the need for a constant revision of the curriculum. Innumerable problems involving the curriculum are constantly presented to the Office of Education but because of a serious lack of personnel and facilities, it is not possible for the Office to render the services requested. A few of the principal types of services which the Office should be in a position to render to States and local school systems, to professional workers in the field of education, and the growing number of institutions and civic organizations interested in education, are the following:

(a) Analysis and interpretation of current economic and social conditions having significance for curriculum workers throughout the Nation.

(b) Evaluation and interpretation of significant revisions of curricula and methods of instruction.

(c) Stimulation and coordination of experimental undertakings looking toward evaluation of various curricular organizations and teaching procedures.

(d) Collection, evaluation, and listing of courses of study and supplementary curriculum materials; establishment of a curriculum laboratory.

(e) Consultation service on the curriculum, especially with State departments of education.

(f) Curriculum conferences; reporting their results.

(g) Preparation, publication, and distribution of fundamental studies concerning curricula, of descriptive accounts of outstanding curriculum practices, and of bibliographies.

For the reasons indicated, a well-equipped curriculum division dealing with the various subject-matter fields and educational activities on the several levels of the school course extending from the nursery school through the university into adult life, should be established in the Office and supported by an appropriation commensurate with the needs.

2. *School building problems.*—Every year this country spends many millions of dollars in constructing school buildings. Several millions of dollars could be saved by the States and local communities each year if a more extensive technical information service on school building problems could be made available through the Office of Education. School building surveys and planning the modern school plant involve highly complex problems. The solutions to these problems require the expert services of a large number of technicians; that is, school superintendents, economists, sociologists, State and district planning experts, school building architects, landscape architects, heating, ventilating, illuminating, and sanitary engineers, statisticians and experts in finance and accounting. There is a vast amount of valuable technical information on school building problems but usually much of this information is not available except to large city school systems. Such information should be available through the Office of Education. It is obvious that the present staff of school building experts in the Office of Education, consisting of only one person, is entirely inadequate to serve the needs of the States and innumerable urban and county school systems.

3. *Educational administration.*—The whole field of organized education may be divided into two large areas, the one having to do with the curriculum and instructional techniques and the other one deal-

ing with organization, administration, and supervision. While school building problems are generally classified in the area of administration, the previous section dealt specifically with the need for Office assistance in connection with school buildings because services related to school-house construction and school building surveys are of unusual importance as a basis for the wise use of the many millions of dollars annually expended on school buildings by the Federal Government, the States, and the local communities.

But apart from the problems of school buildings there is a veritable maze of intricate administrative problems which require constant study if systems of education are to be kept up to date and made efficient. These administrative problems involve questions of support, taxation, finance, educational legislation, personnel, pupil accounting, organization of boards of education, of administrative and supervisory staffs and of school schedules in various types of school systems in rural areas, small urban communities, large cities, counties, regions within States, and the State as a whole. The requests which annually come to the Office of Education for assistance to States and local communities in connection with the vital problems of administration are so numerous that it is impossible for the Office to give the kind of help requested in more than a relatively small number of cases. There is great need for additional appropriations to the Office for the purpose of providing adequate service in this broad field of administration.

B. TO PROMOTE BETTER SOCIAL, ECONOMIC, AND CIVIC EDUCATION.

The development of better machines for industry is stimulated by the profit motive. What is to be done with workmen who are thrown out of work by the machines is a problem the solution of which is not stimulated by the profit motive. Yet public welfare is threatened by the slowness with which this and similar problems are solved.

While industry may be expected to subsidize those sciences which are basic to industrial development, government must see to it that development in the social, economic, and civic phases of life keeps pace with the industrial developments of this machine age.

The following recommendations are to be regarded as supplementary to the one presented previously under the heading, "General curriculum problems."

1. *The social sciences.*—Better social science work in the schools and colleges is the first and most urgent need. Competent staff members to aid the States and local communities in improving the instruction in these studies should be available in the Office of Education.

2. *Crime prevention.*—One of the most disconcerting phenomena of this period is the increase of crime, particularly among youth. Much could be done in the field of crime prevention through education if

there were staff members available in the Office of Education to assist in developing the plans for such education.

3. *Safety education*.—The appalling toll of lives sacrificed and injuries sustained each year by accidents in this country is a sad reminder of our negligence of one phase of social education. Cities with adequate safety education programs have strikingly cut down their accident rates. Surely the Office of Education should be in a position to stimulate the speedy adoption in all communities of programs of education which have been found to be effective for accident prevention in some communities.

4. *Conservation education*.—A keynote of the present policy of the Government is conservation, but the development of this policy is slowed up in its operation if not actually threatened by general lack of understanding among the people of the needs of conservation of natural resources. The problem is essentially one of education. The Office of Education should be in a position through a small staff to advise curriculum workers throughout the country with respect to ways in which the teaching of conservation may be infused into various aspects of the school programs in the different levels of education.

5. *Recreation*.—Good habits and skills in sports and other forms of recreation should be widely developed. Many persons would enjoy sports, hobbies, and other leisure-time activities, if they but knew how to participate in them. There is no one in the Office of Education at the present time whose primary interest is in education for recreation. This need in the Office should be met.

6. *Creative arts*.—Work today offers to many workers little or no opportunity for the expression of their creative impulses. But to many men and women there is no satisfaction so keen as the joy of creating something. To devise ways by which each person can learn to do well some of the creative arts which may occupy his leisure or help him in his chosen occupation, is one of the challenges to education today. The Office of Education should be in position to help to develop and to spread such a program of training in the creative arts. With the exception of one person in the field of industrial arts, there are no professional workers in the Office whose primary interests and abilities are in the general field of creative arts. If this country is to develop an appreciation of the beautiful and the means of giving beauty the practical expression which should characterize an advancing civilization, education must assume vigorous leadership in creating the essential appreciations and artistic skills. To do its part in the development of such a Nation-wide appreciation of the arts, the Office should be provided a staff of competent persons trained in art, music, dramatic art, and creative writing.

C. TO DISCOVER AND PROMOTE THE PROPER EDUCATIONAL USE OF
MOTION PICTURES AND RADIO.

The chief aids to education in the past have been the teacher's voice and the printed page. Visual materials such as maps, charts, and pictures, have supplemented these, but have played a minor role. Laboratories and field trips have been available to a limited extent. But in recent years two new aids with incalculable potentialities have become available, the motion picture and the radio. No one at present will attempt to prophesy how powerful they may become. It is certain that their influence is already great, even though they have found their way into the schools only to a small extent.

During the period when the proper place and function of these new aids to education are being determined, the Office of Education should be in a position to assist in the research and experimentation necessary to find the truth about their proper use. And the Office should be equipped to carry the responsibility for a major portion of the Federal Government's educational broadcasting. There is no provision in the Office of Education at the present time for a service in the field of visual education. There is only one professional position provided for in the regular appropriations to give assistance in the field of radio.

D. TO STRENGTHEN EDUCATIONAL RESEARCH BY A SYSTEM OF COOPERATIVE FELLOWSHIPS

The Office of Education is to a large extent a fact-finding and fact-disseminating agency. In its fact-finding activities it cooperates with many research agencies. It stimulates many investigations. It offers its facilities, so far as possible, to other investigators. It advises institutions and individuals with respect to research projects.

Graduate students in education are frequently engaged in less significant investigations than they would like to be identified with because these students do not have access to materials with which to conduct more significant investigations. The Office of Education, on the other hand, is greatly limited in its ability to carry on research because it lacks competent, trained people in various research fields.

It would be mutually advantageous, therefore, for certain selected students in graduate schools of education to conduct their investigations in cooperation with the Office of Education. In several fields, at least, better training in research techniques could be given them than is afforded in some graduate schools of education. More valuable results would accrue from their investigations. The research program of the Office of Education would be greatly speeded up if these students could be selected by the Office and assigned by their universities to carry on the investigations required by their universities in cooperation with the Office of Education. A small appropria-

tion should be made to the Office of Education to enable it to secure the services of research fellows.

In all the recommendations included herewith there have been few arguments presented in their defense. Proper arguments would require space far beyond the limits allowed for this report.

May I be permitted to state, however, that apart from these proposals based upon the report of the President's Advisory Committee on Education, the other recommendations rest in the main upon a series of many conferences held in the Office of Education in 1936. These conferences were organized around different subjects such as the curriculum, school buildings, the creative arts, and the like. Each was participated in by about 12 leaders, representing diverse agencies and interests in the particular field which was the subject of the conference.

At the conclusion of a 2- or 3-day session each conference group submitted a report to the Commissioner of Education giving the views of the conferees concerning the services which the Office of Education should be staffed to render in the particular field. These conference reports are available to substantiate the recommendations presented.

GENERAL EDUCATION BOARD

The General Education Board, which has as its object the promotion of education within the United States, was created by an act of Congress approved January 12, 1903. Section 6 of this act requires the Corporation to file annually with the Secretary of the Interior a report in writing, stating in detail the property, real and personal, held by the Corporation, and the expenditure or other use or disposition of the same or the income thereof during the preceding year.

On December 31, 1936, principal fund, belonging without restriction to the Board, amounted to \$38,916,046.24. Transactions during the year ended December 31, 1937, resulted in a net decrease of \$2,-582,881.56., or a balance on December 31, 1937, of \$36,333,164.68. This fund is invested in stocks and bonds. In addition, the sum of \$11,230,886.33 has been reserved out of principal, of which \$10,230,-886.33 is reserved to pay appropriations to various educational institutions, while the remaining \$1,000,000 has been referred to the executive committee for appropriation. This fund is invested as follows: Securities \$10,513,470.45, and cash on deposit \$717,415.88. Lapses on prior years' appropriations amounted to \$1,638. Payments during the year amounted to \$6,652,417.77.

The income from the above funds, together with income from undistributed income, amounted during the year to \$2,017,775.66; the balance of income from the previous year as of December 31, 1936, amounted to \$8,232,488.88, which, together with sundry refunds amounting to \$3,343.25, increase the total to \$10,253,607.79. Disbursements from income during the year amounted to \$3,352,539.40, leaving an undistributed balance of income on December 31, 1937, of \$6,901,068.39. Of this sum \$5,560,669.45 is invested in securities; \$674,641.68 in cash on deposit; and \$665,757.26 representing the net sum of advances, deferred charges, and sundry accounts receivable under appropriations, which are to be accounted for. This balance of \$6,901,068.39 consists of: Unpaid appropriations \$5,849,548.64; amounts reserved for unappropriated authorizations \$208,761; and the sum of \$842,758.75 which remains unappropriated.

There was appropriated from income during the year the sum of \$2,786,137.74. Lapses on account of prior years' appropriations amounted to \$458,799.07, however, leaving a net increase in income appropriations of \$2,327,338.67.

The Anna T. Jeanes fund, the principal and interest of which are to be used for Negro rural schools, amounted, on December 31, 1936, to \$15,919.21. This sum was appropriated during the year and added to the sum of \$12,500 remaining unpaid at December 31, 1936, resulting in a total sum appropriated of \$28,419.21. Payments during the year amounted to \$20,919.21, leaving the sum of \$7,500 unpaid at December 31, 1937. This amount was in cash on deposit.

The balance in the Anna T. Jeanes fund income account at December 31, 1936, amounted to \$1,223.50, which consisted of unpaid appropriations of \$875, and an unappropriated balance of \$348.50. During the year this balance (\$348.50) was appropriated, and the entire fund, amounting to \$1,223.50 was disbursed.

DIVISION OF INVESTIGATIONS

B. B. Smith, *Director*

THE annual appropriation for the Division of Investigations for the purpose of investigating official matters under the control of the Department of the Interior for the fiscal year 1938 was \$436,100. The sum of \$50,750 emergency funds was also allocated for investigative work pertaining to emergency projects.

The number of special agents employed in the Division as of June 30, 1938, was 79, of which number 69 were regular special agents and 10 were paid from emergency funds. In addition to the special agents there were five special agents in charge directing the special agents, under the supervision of the director, at offices maintained at San Francisco, Calif.; Billings, Mont.; Salt Lake City, Utah; Albuquerque, N. Mex.; and Washington, D. C. The total force employed, including the director, assistant director, reviewer and clerks, was 125.

Requests for investigations during the past fiscal year, originating in the various bureaus and offices and affecting practically every activity of the Department, showed a marked increase over those of the preceding year. On June 30, 1937, there were 9,897 cases pending; 11,054 cases were received during the year; 9,037 were investigated; and 11,914 uninvestigated cases were pending on June 30, 1938.

The most important work, both from a standpoint of volume and the necessity for prompt action, arose under section 15 of the Taylor Grazing Act. A total of 4,100 applications for lease were investigated and reported during the fiscal year. In these cases the special agents determined the qualifications of the applicants, the carrying capacity of the lands, the number of head of livestock which such lands would support each year, and the rental fees. In addition numerous other minor factors were determined, such as the need of the lands for stock driveway purposes or, if they contained permanent water, the desirability of having them set aside as public water holes. A number of cases were complex because of the large number of conflicting applications, but in most instances the special agents were successful in bringing about compromises between the applicants.

Field examinations were also made under section 7 of the Taylor Grazing Act which provides for classification of lands within and without grazing districts which are suitable for other than grazing

purposes. Field examinations were also made under section 8 of the same act which provides for the exchange of State owned or privately owned lands. Field investigations were made to determine whether the lands involved in these exchanges were of equal value and area, and also whether the question of public watering places was involved.

Section 14 of the above-mentioned act liberalized the previous provisions of law with respect to purchases of isolated tracts of lands, with the result that these cases necessitated field examinations for the purpose of appraisal.

Notwithstanding the generally accepted belief that the withdrawal of public lands from homestead entry has lightened the burden of the Division of Investigations with regard to homestead cases, the work remains at about the same figure. On July 1, 1937, there were 2,399 homestead cases pending investigation; during the fiscal year ended July 1, 1938, 1,473 cases were received and 1,513 cases investigated; leaving a total of 2,359 pending investigation. The large number of homestead entries to be investigated is due principally to the regulation of grazing on public lands which has given rise to complaints of livestock operators who previously have been inclined to adopt a passive attitude toward fraudulent entries involving lands upon which grazing was not regulated. Also, it is apparent that many homestead claimants who formerly renewed their entries under the provisions of the act of September 5, 1914, but who are now prevented from making such renewals by the Executive withdrawal of November 26, 1934, are inclined to attempt final proof on their entries rather than allow them to be canceled or relinquished upon the expiration of the statutory period allowed for compliance with homestead requirements.

During the last fiscal year a considerable number of cases were handled for the Bureau of Reclamation, such as the examination of lands claimed to be valuable for minerals, including the appraisal of patented lands, as well as unpatented mining claims, involved in new reclamation projects. Cases of this nature have been handled and are pending in connection with the Central Valley project in California. A reappraisal of land under the Boise, Idaho, project was made. Test runs for gold placer gravels on approximately 1,200 acres were made on the area to be partially flooded by the Caballo Reservoir, near Hatch, N. Mex.; as a result there was a reduction in the claim of property owners for damage which would be caused by flooding of the property from \$200,000 to approximately \$36,000.

A total of 95 cases involving coal, timber, and grazing trespasses were investigated during the year. As a result of these investigations \$141,991.46 were recovered for the Government. In one case which involved a coal trespass, \$133,114.74 was collected under a judgment in the Federal court.

The following criminal and penal code violations were investigated during the fiscal year ended June 30, 1938:

Embezzlement.....	4
Fraud, sale of oil and homestead land.....	1
Fraud, acquisition, public land.....	1
Perjury.....	2
Grazing trespass.....	8
Bribery.....	2
Impersonation of Federal officers.....	2
Fraud.....	1

Eleven persons were indicted during the year and eight were convicted. One defendant was sentenced to a term of 6 to 12 years and fined \$36,000. Nine criminal cases are pending action.

A number of hearings based upon investigations and reports submitted by the investigators were conducted in behalf of the United States by the special agents who have charge of hearings, resulting in the restoration to the public domain of thousands of acres of land in cases where fraudulent final proofs were attempted and the law not complied with.

Special agent auditors made all the audits of Indian agencies and guardianships, as well as the audits of concessionaires operating under contracts in the various national parks and national monuments. Typical of other important types of accounting performed by this Division was the audit of the sales of potash from Government leased lands to determine the amounts due in royalties.

Official conduct and personnel cases were investigated under authority of the Secretary of the Interior, and investigations were made involving applications to practice before the Department.

PETROLEUM CONSERVATION DIVISION

George W. Holland, *Director*

THE PETROLEUM CONSERVATION DIVISION was established to assist the Secretary of the Interior in administering the act of February 22, 1935 (49 Stat. 30), as extended by the act of June 14, 1937 (50 Stat. 257); to cooperate with the Interstate Oil Compact Commission and the oil- and gas-producing States in the prevention of waste in oil and gas production and in the adoption of uniform oil- and gas-conservation laws and regulations; and to keep informed currently as to the movement of petroleum and petroleum products in interstate commerce and undue burdens or restrictions thereof which may be caused, in whole or in part, by lack of parity between the supply of and consumptive demand for petroleum and petroleum products, in the event that such facts may be required by the President for the exercise of his responsibility under section 4 of said act. The establishment of this Division was authorized by Executive Order No. 7756, dated December 1, 1937.

The act of February 22, 1935, generally known as the Connally law, regulates interstate and foreign commerce in petroleum and petroleum products by prohibiting the shipment in such commerce of petroleum and its products produced in violation of State law. It was to have expired June 16, 1937, but was extended to June 30, 1939, by the act of June 14, 1937. By Executive Order No. 7756, dated December 1, 1937, the Secretary of the Interior was designated by the President to execute during the extended period certain powers and functions vested in the President by the law, and Executive Orders Nos. 7757 and 7758 of December 1, 1937, were issued for the administration of the law, as extended. By Executive Order No. 7759, dated December 1, 1937, the President revoked Executive Order No. 7024-B, of April 25, 1935, which created Federal Petroleum Agency No. 1 as an administrative and investigative agency in connection with tenders presented to Federal Tender Board No. 1, and Executive Order No. 7129-A, of August 6, 1935, which required the submission to the Division of Investigations, Department of the Interior, of reports of loadings and discharges of certain cargoes of petroleum and petroleum products in interstate commerce, said Executive orders having been superseded by

Executive Orders Nos. 7757 and 7758. By Order No. 1263, of April 1, 1938, the Secretary of the Interior prescribed and approved forms of reports required under Executive Orders Nos. 7757 and 7758.

OPERATIONS IN THE EAST TEXAS AREA

Federal Tender Board No. 1, at Kilgore, Tex., was reestablished by Executive Order No. 7758, of December 1, 1937, under the Connally law as extended. It operates in a designated area, known as the East Texas field, and is required, upon application, to issue certificates of clearance, or tenders, permitting the shipment in interstate commerce of petroleum or petroleum products whenever it determines that the petroleum or petroleum products do not constitute contraband oil, as defined in the act.

During the fiscal year, 6,942 applications for tenders, of which 4,992 were for 254,614,303 barrels of crude oil and 1,950 for 27,716,209 barrels of petroleum products, were received and considered. All of the applications were approved except 76 for 2,533,367 barrels of crude oil and 19 for 149,935 barrels of products. Tenders were approved for 251,628,058 barrels of crude oil and 27,641,664 barrels of petroleum products. Eighteen approved applications for tenders were reduced by the Board in the aggregate quantity of 512,418 barrels. At the close of the fiscal year, 25 tender applications, involving 1,793,324 barrels of crude oil and 55,272 barrels of products, were pending. The aggregate quantity of petroleum approved for shipment in interstate commerce was substantially larger than that actually produced in the East Texas field, owing to the retendering monthly of legally produced oil held in storage and oil previously tendered but not shipped, the approval of tenders covering oil produced elsewhere but received in the East Texas area, and the issuance of tenders on oil interchanged between companies operating in the area.

During the fiscal year, the reported actual production of petroleum in the East Texas field was 158,640,553 barrels, or 434,645 barrels daily, while withdrawals of East Texas crude oil from storage totaled 654,136 barrels, making a total of 159,294,689 barrels. Of this amount, 150,555,255 barrels, or 94.5 percent, was shipped from the area through the 13 trunk pipe lines; 8,637,152 barrels, or 5.4 percent, was processed at refineries located in the field; and the balance of 102,282 barrels, or 0.1 percent, includes crude used in the field, inventory adjustments, and losses.

There were 25,261 producing oil wells in the East Texas field on June 30, 1938, of which 2,457 were completed during the fiscal year, as compared with 2,128 new well completions during the previous fiscal year. The average well density of the field was increased from one well to 5.7 acres on June 30, 1937, to one well per 5.2 acres on

June 30, 1938. The average reservoir pressure declined from 1,163.26 pounds per square inch on June 12, 1937, to 1,120.84 pounds per square inch on June 8, 1938, a decrease of 42.42 pounds. An average of approximately 3,740,000 barrels of crude oil was produced for each pound of decline in reservoir pressure.

Ten refineries were operating on Federal tenders in the East Texas field at the beginning of the fiscal year and eight at the close. These plants processed 9,685,205 barrels of crude oil, of which 8,637,152 barrels, or 89 percent, was obtained from the East Texas field, and 1,048,053 barrels, or 11 percent, was obtained from other fields. The receipt of crude oil from other sources than the East Texas field increased materially during the latter half of the fiscal year, reaching a peak in June 1938, when 30 percent of the crude oil processed in East Texas refineries was obtained from other fields in Texas, Louisiana, and Arkansas.

The following table summarizes the operations, during the fiscal year, of the East Texas refineries operating on Federal tenders and shipping in interstate commerce.

Summary of East Texas Refinery Operations, 1938 Fiscal Year

	Barrels	Percent
East Texas crude charged to stills.....	8,637,152	89.18
Southwest Texas crude charged to stills.....	123,257	1.27
Louisiana crude charged to stills.....	897,187	9.26
Arkansas crude charged to stills.....	27,609	.29
Total crude distilled.....	9,685,205	100.00
Products manufactured:		
Gasoline and naphthas.....	5,735,222	59.22
Kerosene.....	486,742	5.02
Gas oils and distillates.....	282,732	2.92
Fuel oil.....	2,016,501	20.82
Unfinished oils.....	722,446	7.46
Losses in refining.....	441,562	4.56
Total.....	9,685,205	100.00

Sixteen natural gasoline plants, connected to 23,018 wells on June 30, 1938, reported operations to Federal Tender Board No. 1 during the fiscal year. These plants processed 49,239,915 m. c. f. of lease and still gas and extracted therefrom 5,973,613 barrels of natural gasoline, 496,144 barrels of butane, and 24,653 barrels of propane, or a total of 6,494,410 barrels. This represents an average of 5.5 gallons of natural gasoline, butanes and propanes per m. c. f. of gas processed. The average gas-oil ratio of the 23,018 wells connected to these plants during June, 1938, was 346.75 cu. ft. per barrel of crude.

EXAMINATIONS OUTSIDE OF THE EAST TEXAS AREA

Regulation XIX, of Executive Order No. 7757, provides that the Petroleum Conservation Division or any board established under the Connally law, when authorized by the Secretary of the Interior, shall make necessary investigations, within or outside of any designated area, to accomplish the purposes of said act. Several investigations were authorized by the Secretary of the Interior, under said regulation, between its effective date, December 1, 1937, and the close of the fiscal year.

On March 9, 1938, the Secretary of the Interior authorized an investigation of certain injunction proceedings brought against the Arkansas Board of Conservation and the status, under the Connally law, of oil produced in the south Miller County field, Arkansas, during the period covered by the injunction. A similar inquiry was authorized June 17, 1938, as to certain petroleum produced in Kansas under injunction against the Kansas Corporation Commission.

On April 7, 1938, the Secretary of the Interior authorized an extended investigation of alleged excessive production of crude oil in a number of fields in Southern Louisiana. On April 21, 1938, he authorized an examination of the oil-proration procedure in the States of Arkansas, Kansas, Louisiana, New Mexico, Oklahoma, and Texas, for the purpose of determining the manner in which said procedure affects the administration of the Act of February 22, 1935, and contributes to the ultimate recovery and the conservation of oil and gas resources. All of said investigations were undertaken by Federal Tender Board No. 1.

DAILY REPORT ON EAST TEXAS TANK-CAR SHIPMENTS

Regulation XV, Executive Order No. 7757, of December 1, 1937, provides that each transporting agency, other than pipe lines, shall make available daily to Federal Tender Board No. 1 copies of all way-bills covering the movement during the preceding day of petroleum or petroleum products in or from the East Texas area. The information thus obtained as to tank car shipments of petroleum products from the area is tabulated in a special daily report, which includes the tank car designation, capacity and contents, shipper, consignee and destination. A copy of this report is mailed daily to designated officials of all States in which tank car shipments of petroleum products from the East Texas area customarily are received. Shipments as reported in the reports are checked by the State officials against the actual receipts and Federal Tender Board No. 1 notified as to diversion of shipments or other differences. The following table shows the trend

of gasoline production and shipments by tank car from the East Texas area during the 1938 fiscal year:

Gasoline Production and Shipments From East Texas Field by Tank Car

[In barrels]

	Shipments				Produced in East Texas refineries
	Intra-State	Coastwise	Interstate	Total	
1937:					
July.....	275, 082	198, 708	219, 260	693, 050	649, 000
August.....	245, 429	155, 238	240, 160	640, 827	642, 131
September.....	265, 559	179, 115	259, 057	703, 731	654, 900
October.....	231, 959	141, 383	216, 574	589, 916	609, 233
November.....	180, 083	105, 057	270, 391	555, 531	579, 682
December.....	182, 885	97, 628	195, 947	476, 460	480, 373
1938:					
January.....	132, 738	55, 542	175, 685	363, 965	395, 417
February.....	176, 775	105, 409	98, 338	380, 522	330, 158
March.....	143, 526	68, 647	141, 239	353, 422	342, 768
April.....	106, 509	39, 156	128, 682	274, 347	386, 289
May.....	143, 791	72, 125	157, 749	373, 665	341, 323
June.....	120, 833	50, 815	148, 733	320, 381	332, 948
Total.....	2, 205, 179	1, 268, 823	2, 251, 815	5, 725, 817	5, 735, 222

NOTE.—Coastwise shipments are those transported by tank car to the Gulf Coast for shipment by water to Atlantic Coast. Interstate shipments are those to Midwestern States. Refinery production does not include output of plants operating without Federal tenders and shipping gasoline by truck to points in Texas.

REPORTS ON PETROLEUM SHIPMENTS BY WATER

Regulation XVIII, Executive Order No. 7757, dated December 1, 1937, requires the submission of reports (on Forms OCR-1 and OCR-2) covering the loading at any port in Texas and Louisiana of petroleum or petroleum products for shipments by water in intermediate and interstate commerce and the unloading of said cargoes at any port in the United States. New forms were approved by the Secretary of the Interior for use in this connection, effective April 1, 1938. In addition to the information required previously as to the vessel and cargo (the OCR-1) form in use since April 1 requires the duly authorized agent of the shipper to cite the number and date of the State tender or the date and designation of the order of the State regulatory commission applicable to the cargo loaded and requires the execution of the report before a notary public.

Shipments reported to have been made under tenders issued by the Railroad Commission of Texas are totalled and a comparison thereof is made monthly with the tenders as issued by the commission to make certain that shipments thereunder were not in excess of the amounts authorized. Similarly, cargoes of petroleum loaded at ports in Louisiana are checked against the appropriate production orders of the Louisiana Department of Conservation. Cargoes originating in New Mexico and Oklahoma also are checked against the production orders of the New Mexico Oil Conservation Commission and the Oklahoma Corporation Commission. A copy of each report covering the loading of a cargo of petroleum products for shipment in interstate com-

merce is forwarded, promptly upon its receipt by the Petroleum Conservation Division, to a designated official of the State in which the reported destination of the shipment is located, in order to provide information as to the reported cargo in advance of its arrival. At the close of each month, the details of each shipment, including State tender or order number, are tabulated and a photostatic copy of the report is sent to all interested State and Federal agencies.

These reports, covering the loadings of cargoes of petroleum and petroleum products, provide a procedure for checking a substantial proportion of the petroleum shipped in commerce in Louisiana and Texas, to make certain that said shipments do not include petroleum or petroleum products produced in excess of the amounts permitted by State law or orders thereunder. The total of all loadings of petroleum and petroleum products at Texas ports, reported on Form OCR-1 during June 1938, was equal to 70 percent of the calculated total of all oils handled in Texas during that month, including current production, receipts from Louisiana, New Mexico, and Oklahoma, and withdrawals from or additions to storage; while loadings at Louisiana ports, similarly reported, were equal to 81 percent of all oils handled in southern Louisiana.

COST OF ADMINISTRATION

The administration of the act of February 22, 1935, is essentially a field activity. Of the 94 persons employed at the close of the fiscal year, 76 were in the field and 18 in Washington.

The following table shows the expenditures made of available funds:

Personal services:		<i>Appropriation</i>
Petroleum Conservation Division.....		\$45, 300
Federal Tender Board No. 1.....		174, 360
Total.....		219, 660
Miscellaneous:		
Materials and Supplies.....		12, 453
Communications.....		2, 252
Travel.....		8, 232
Transportation of things.....		511
Printing and binding.....		2, 823
Rent of buildings.....		6, 737
Equipment.....		7, 248
Total.....		40, 256
Total obligated.....		259, 916
Unobligated.....		25, 084
Total funds available.....		285, 000

DIVISION OF INFORMATION

Michael W. Straus, *Director*

A DIVISION OF INFORMATION within the Office of the Secretary was established by administrative order No. 1213, dated September 24, 1937.

The Division coordinates the various informational activities of the Department and disseminates useful information developed by the economic, research, and conservation programs of the Department.

The Division supervises preparation of publications, public announcements and releases to the press with the exception of purely scientific and technical papers; supervises radio programs sponsored or authorized by the Department, and supervises the production and distribution of official photographs.

The Division consists of the Director's office, a Radio Section, a Publications Section, and a Photographic Section.

DIVISION OF MOTION PICTURES

Randall M. White, *Acting Director*

A SIGNIFICANT development during the Division's fourth year of operation has been the greatly increased interest on the part of the general public in motion pictures dealing with governmental activities.

The distribution of film in all fields was more than doubled during the year. Approximately 500 Civilian Conservation Corps camps received regular weekly service to supplement their educational programs; thousands of schools used the same productions as integral parts of their curricula. The size of the library was not materially increased, but more efficient methods of handling kept 50 percent more reels in constant circulation than during the previous year. C. C. C. camp circuits were established to minimize time lost in transit. Requests for films by schools, churches, fraternal and other organizations were accommodated insofar as prints were available but the Division was obliged to deny service to 25,000 borrowers with potential exhibition to at least 3,000,000 people. An increase of at least 25 percent in prints of the Division's catalog would have been required to meet the demands during the fiscal year.

Motion-picture-making activities of the Division were confined to the production of sound subjects for governmental agencies, both inside and outside the Department of the Interior, on a repay basis. "Home Rule on the Range" exemplified the workings of the Taylor Grazing Act for Interior's Division of Grazing. "Know Your Coal" was produced for the Consumers Counsel of the National Bituminous Coal Commission. "Help by the Carload" was made for the Government Printing Office as part of its campaign to increase the sale and distribution of public documents. "The Land—To Have and to Hold," for the Farm Credit Administration, deals with the problem of agricultural credit in relation to the Federal Farm Loan Act, the Federal land banks, and the national farm loan associations.

OFFICE OF EXHIBITS

G. C. Dickens, *Supervisor*

GOVERNMENT participation through exhibits at national and international expositions, State fairs, and at scientific and educational conventions, has become an established policy. One important function of all Government departments and independent establishments should be to acquaint the general public with the many, varied services being carried on by them for the benefit of the people.

Experience has proven that one of the most satisfactory methods of informing the public is participation in expositions and the other meetings. In this work the use of motion pictures, animated dioramas, cycloramas and panoramas, models, stereopticon slides and colored transparencies, and murals, has proven to be highly successful and adaptable. In making presentations relating to our island and Territorial possessions and the American Indian, experience has proved that the display of native handicraft is important.

The Office of Exhibits has designed and constructed departmental exhibits which have been displayed at the Great Lakes and Texas expositions. In addition, one diorama has been designed and constructed for the Division of Territories and Island Possessions, and another large diorama, with day and night, animation, and sound effects, is in the course of construction. The Office of Exhibits is constructing the conservation exhibit which will be displayed in the Federal Building at the New York World's Fair in 1939 as well as six dioramas for the foods exhibit at the same exposition.

OFFICE OF THE ADVISER ON NEGRO AFFAIRS

Dewey R. Jones, *Associate Adviser*

NEGRO participation in the national park recreational demonstration program was one of the major interests of the Adviser on Negro Affairs during the year. Other activities of the Adviser included the publishing of reports on the survey of the training and employment of white collar and skilled Negro workers; C. C. C. personnel problems, labor problems on Bureau of Reclamation projects and personnel problems within the Department.

During the past fiscal year plans have been worked out between the National Park Service and the Office of the Adviser on Negro Affairs which called for six demonstration projects for Negro use in the Southern States, to be completed by the summer of 1939, as part of the national park recreational demonstration program. Plans have also been completed for Negro participation in other projects of this program in northern and western States. In the last fiscal year the Adviser made trips to Louisville, Ky., Nashville, Tenn., Birmingham, Ala., Memphis, Tenn., Atlanta, Ga., Durham, N. C., Richmond, Va., St. Louis, Mo., Grand Rapids, Mich., Indianapolis, Ind., Cincinnati, Ohio, and Chicago, Ill., and conferred with national park officials in Regions 1 and 2 in connection with this program.

SURVEY

As administrator of the survey on the training and employment of white collar and skilled Negro workers, the Adviser on Negro Affairs continued the second phase of this program during the past fiscal year. Statistical information on Negro urban workers, gathered in the first part of this survey, was published as volume 1 of the report by this office. At the same time volume 2 was at the Government Printing Office. Begun in 1936, the survey employed 1,800 people in 86 cities and was financed by an allocation of \$476,000 from the Works Progress Administration. Workers in this phase of the survey turned in 350,000 Hollerith punch cards which furnished the data on which the report is based. At the end of the past fiscal year 25 persons were at work in this office taking off data from these cards which will be used in the third volume of the series. Volume 1 of the report has already proven of interest to social workers, those interested in labor and racial problems, and to colleges.

HOUSING

The Wagner-Steagall Housing Act created the United States Housing Authority and transferred from the Public Works Administration its Division of Housing. One of the major interests of the Adviser on Negro Affairs had been the Negro participation in the P. W. A. housing program both as workers and tenants. It is estimated that 40 percent of the money spent by P. W. A. for low-cost housing was spent on projects to be occupied by Negroes. Of the projects planned for Negro occupancy, at least 20 will have Negro managers or assistant managers. With the consent and cooperation of the Director of Emergency Personnel most of the applicants for these places were personally interviewed either by the Adviser on Negro Affairs or the Associate Adviser.

Contract requirements suggested by the Adviser on Negro Affairs and carried out by the Legal Division of the Public Works Administration specified definite percentages for Negro skilled and unskilled labor for the construction work on low-cost housing. The final labor report covering all projects built by the Housing Division of P. W. A. shows that Negro mechanics received 6 percent of the money spent for skilled labor and 40 percent of the money spent for unskilled labor. Dr. Robert C. Weaver, Adviser on Negro Affairs since 1934, became Special Assistant to the Administrator of the United States Housing Authority in January 1938.

BOARD ON GEOGRAPHICAL NAMES

George C. Martin, *Executive Secretary*

THE UNITED STATES BOARD ON GEOGRAPHICAL NAMES provides for uniformity in the use of geographic names on maps and in publications issued by the Federal Government.

The Board also serves as an informally recognized standard authority in the nongovernmental use of geographic names. In this capacity it gives decisions on geographic names at the request of the local officials of the States, or at the request of institutions, publishers, or other individuals. Such decisions are binding equally with those rendered at governmental request, so far as the governmental use of the name is concerned, but they are not binding upon other users. As the general, nongovernmental acceptance of the decisions of the Board is based upon the prestige of the Board and upon the merits of its decisions, rather than upon any legal basis, special efforts are made to see that the decisions merit such acceptance.

There has been a belief that the decisions of the Board are changes in names. The decisions of the Board, for the most part, are findings of fact as to which of two or more conflicting names is the actual name that has been conferred by local or other competent authority or sanctioned by local usage. The Board very rarely changes a name, and then only for some very compelling reason. As the main purpose of the Board is to insure uniform usage and to prevent confusion, every effort is made to avoid changes in names and to recognize and help to establish appropriate existing names.

The Board consists of an advisory committee, on which various Government departments and geographic societies are represented, which acts chiefly through its executive committee; and of an administrative and investigative unit, the Division of Geographic Names, the office of the Secretary of the Interior. The personnel of the advisory and executive committees, on June 30, 1938, was as follows:

ADVISORY COMMITTEE

Lt. Commander K. T. Adams, Assistant Chief, Division of Charts, Coast and Geodetic Survey, Department of Commerce.

Mr. Clarence Batschelet, Geographer, Bureau of the Census, Department of Commerce.

Mr. Albert H. Bumstead, Chief Cartographer, National Geographic Society.

ST. ELIZABETHS HOSPITAL

Winfred Overholser, M. D., *Superintendent*

I HAVE the honor to submit herewith my first annual report as Superintendent of St. Elizabeths Hospital.

On March 3, 1855, the Congress, in establishing this institution, declared its objects to be "the most humane care and enlightened curative treatment" of the patients who should enter its walls. Under the progressive leadership of my four distinguished predecessors, Dr. Charles H. Nichols, Dr. W. W. Godding, Dr. A. B. Richardson, and Dr. William Alanson White, the institution has achieved an enviable reputation as one of the outstanding mental hospitals of the world. Having been honored by beings elected to succeed these great men, it will be my consistent aim and the object of my most earnest efforts to maintain the high traditions and standards of St. Elizabeths Hospital.

Psychiatry has progressed far since 1855, and is still in a state of flux. In the past this hospital has made its contributions to psychiatric knowledge, and has always shown a readiness to accept the discoveries and findings of others so far as they promised to add to the comfort and welfare of the patients. The hospital was one of the pioneers in this country, for example, in the use of hydrotherapy, and was the first in the United States to employ the malarial treatment of general paresis developed so brilliantly by Wagner-Jauregg. As time goes on, new methods of treatment will be developed, perhaps here, perhaps elsewhere. As they are developed and appear to offer benefit to the patients, they will be adopted. Whatever the scientific developments in the field of psychiatry, however, one old and sound principle will always be adhered to; that of kindness, considerateness and courtesy in dealing with patients, their relatives, the employees and the public, with the welfare of the patient ever paramount.

The functions of a public mental hospital do not end with "the most humane care and enlightened curative treatment" of its patients. Such an institution owes an obligation to the scientific world in spreading knowledge and in carrying on research activities. The tradition of teaching at St. Elizabeths Hospital is a long one. The hospital is recognized by the American Medical Association and the American College of Surgeons for the training of internes (rotating internship), probably being the only mental hospital in the country

so recognized. In addition, it is accredited for the training of residents in psychiatry. This institution is proud of the large number of its medical alumni who have achieved success in the psychiatric world. The vast amount of clinical material available for teaching purposes is likewise used in the teaching of the medical students of George Washington, Georgetown, and Howard Universities. Postgraduate instruction is given to officers in training in the Naval Medical School, and in addition officers of the Army and Navy Medical Corps are assigned to the hospital for instruction. Other teaching activities involve college classes in psychology, and students in social work and dietetics. It is quite likely that in the future these activities will be extended to include students of theology and of occupational therapy.

MOVEMENT OF PATIENT POPULATION

On June 30, 1938, 5,968 patients remained in the hospital as compared with 5,667 on June 30, 1937, an increase of 301.

The total number of patients under treatment during the year was 6,696, as compared with 6,489 the preceding year, an increase of 207.

The total number of admissions during the year was 1,029, as compared with 1,099 the preceding year, a decrease of 70. This decrease was due primarily to the passage of the Act on June 8, 1938 entitled "Commission on Mental Health of the District of Columbia," providing for the admission of District patients. From the date of approval of this act until appropriation was made permitting the new Commission to function, there were no admissions to the hospital from the District of Columbia, that is, from June 8, 1938 to June 30, 1938, inclusive.

The total number of discharges for the year was 461, as compared with 490 in the preceding year, a decrease of 29.

The total number of deaths for the year was 267, as compared with 332 for the preceding year, a decrease of 65. It will be noted that there is a decrease in the number of deaths, notwithstanding an increase in population.

The total number of discharges and deaths, combined, was 728, compared with 822 for the preceding year, a decrease of 94.

There were 64 burials in the hospital cemetery, as compared with 50 the preceding year, an increase of 14. All honorably discharged service men are entitled to burial in the Arlington National Cemetery. Several former service men who had been dishonorably discharged are included in those buried in the hospital cemetery, in that part known as the military section. The other 203 bodies were buried by private undertakers, in military and other cemeteries in Washington and elsewhere throughout the United States.

The daily average patient population was 5,835.7, as compared with 5,537.6 the preceding year, an increase of 298.1.

Movement of Patient Population, Fiscal Year 1938

	Male			Female			Total
	White	Colored	Total	White	Colored	Total	
Remaining on rolls June 30, 1937.....	2,854	890	3,744	1,207	716	1,923	5,667
Admitted during year ended June 30, 1938.....	496	179	675	240	114	354	1,029
Total number under care and treatment during year ended June 30, 1938.....	3,350	1,069	4,419	1,447	830	2,277	6,696
Discharged as—							
Not insane.....	5	1	6	0	1	1	7
Recovered.....	80	15	95	21	15	36	131
Improved.....	104	28	132	30	7	37	169
Unimproved.....	96	18	114	27	13	40	154
Total discharged.....	285	62	347	78	36	114	461
Died.....	106	67	173	54	40	94	267
Total of patients discharged and died.....	391	129	520	132	76	208	728
Number of patients remaining on rolls June 30, 1938.....	2,959	940	3,899	1,315	754	2,069	5,968

MEDICAL DEPARTMENT

Medical services.—The women's service has made several changes, transferring the disturbed patients from C building to P building, and changing the patients from B to C building. L building, which was formerly an open building, is now a closed ward in order to take better care of this class of patients. J and K buildings, formerly used for white patients, are now used to house colored patients. This reduced the number of patients in the Oaks buildings, which were very much overcrowded.

All the feeble white patients have been transferred to C building. Here it has been possible to classify this group of patients more satisfactorily, as there are four wards in the building whereas this group, which was formerly housed in I building and which had no separate wards, was permitted no suitable classification. The patients formerly in K building have been transferred to I building.

Ward No. 3 in the women's receiving service was in use as a special treatment ward for insulin and metrazol therapy from September 1, 1937, until June 1, 1938, when the ward was closed for the summer months. About 100 patients were treated during the period. Prior to the starting of the insulin therapy, Rorschach tests were made on patients and will be checked again following completion of therapy. Due to the excessive heat during the months of June, July, and August, it was not considered advisable to continue the insulin treatment. It is expected that the ward will be reopened soon after September 1, 1938, for continuation of the special treatment.

Equipment has been purchased for a beauty parlor on the colored service. The basement of Q building is to be remodeled to house this equipment.

Tuberculosis cottages No. 4 and No. 5, formerly used for tuberculous patients, are now vacant as these patients were transferred to Glenside Building, formerly known as Isolation Building. The name of the tuberculosis cottages will be changed to female cottages No. 1 and No. 2 and be used for housing colored patients, providing 44 additional beds for this purpose.

Studies are being carried on at present concerning the effects of benzedrine sulphate in depressions, and of amniotin and theelin in the depressions of later life. Investigations of the significance of hyperostosis frontalis interna are under way.

A project on the study of the relationship between hearing defects and paranoid tendencies has been begun.

A study of the effect of a new drug, dilantin, upon epileptic convulsions has been started.

The colored male patients, formerly cared for in tuberculosis cottage No. 1, have been transferred to ward No. 3 of the building for male tuberculous patients. Following this transfer cottage No. 1 was carefully cleaned and disinfected and turned over to white non-tuberculous patients.

The names of the tuberculosis cottages No. 1, No. 2, and No. 3 were changed to male cottages 1, 2, and 3.

The male Indian patients are cared for in ward C of Continuous Treatment Building No. 2.

The quadrangle in the rear of Continuous Treatment Buildings No. 1 and No. 2 is of great value in giving the patients in these two buildings a sufficient amount of fresh air and exercise. They are allowed to play ball and indulge in other suitable forms of recreation, and seem to enjoy these privileges.

Medical and surgical service.—There is noted a marked increase in the number of tuberculous patients admitted to the service for the purpose of receiving pneumothorax therapy. There are listed 17 such patients and each patient has received pneumothorax a varying number of times.

The malarial treatment of paretics has proceeded as usual, with periodic inoculations. The type of malaria used during the past year has been exclusively the quartan type. Toward the end of the year, however, arrangements were made for reintroducing into the service the use of tertian malaria to be used with those patients who did not successfully take quartan malaria.

Greater efficiency and ease of treatment and better results in the cases of fractures of the hip have been noted since the surgical service acquired the necessary apparatus and equipment for the use of the Smith-Peterson nail.

The number of operations reported by the Surgical Service for the fiscal year was 227.

The antiluetic clinic reported 9,819 patient visits during the year. Each of these visits was for the purpose either of withdrawing blood or spinal fluid for serological examination, or giving intravenous or intramuscular therapy.

A group of parietic patients who have been resistant to malarial therapy and the usual antiluetic drugs, has been placed on a new pentavalent arsenical known as "Aldarsone."

During the year patients have been examined and treated in the various special clinics as follows:

Ophthalmological.....	670
Otolaryngological.....	407
Dermatological.....	1,399
Gynecological.....	642
Urological.....	598

Nine hundred and sixty-five patients have come to the physiotherapy clinic, and these and patients in the ward have received 10,728 treatments.

During the year 4,283 radiographs were made on 2,518 patients, and 588 X-ray treatments were administered to 104 patients.

Three thousand five hundred and three patients have made 6,004 visits to the dental clinic.

Two thousand three hundred and six patients have made 4,009 visits to the minor surgical clinic.

Laboratory.—Out of 267 deaths, 174 autopsies were held, a percentage of 66 $\frac{2}{3}$ percent.

One hundred and forty-one brains were dissected during the year, 139 surgical specimens were studied, and 183 gross specimens were photographed.

In the photographic department there were 1,308 pictures taken, 2,059 other prints, and 1,000 feet of 16 mm. motion pictures

In the clinical pathological department there were 4,834 routine examinations of urine, 1,479 hemoglobin estimations, and 251 examinations of sputum.

Great numbers of blood chemistry and glucose tolerance tests were carried out preparatory to, during, and after many individual courses of treatment.

A quotation from the report of the committee appointed by the Secretary of the Interior, with the approval of the President, in 1911, is timely:

It is believed that the medical staff of the hospital should do its share by scientific research in adding to the general fund of information regarding disorders of mind, making every effort within its power to throw light upon the complicated problems with which it has to deal. Further than this, aside wholly from what may or may not be accomplished in the way of adding to the fund of information regarding mental disorder by research work, the presence of scientific research going on in a hospital is essential at this day and age to keep the medical staff

acutely, actively, and aggressively interested in the problems with which they come into daily contact, and it alone is capable of so improving the esprit de corps as to increase materially the efficiency of the hospital in dealing with its patient problems. Scientific work going on in an institution for the care of the insane is some sort of a barometric index of the kind of care that they are receiving. Places where scientific research is not being conducted are apt to be places where problems of care and treatment are not being aggressively attacked and advanced, whereas the contrary is true in general of those institutions where scientific work is being done. The spirit that makes for progress is the spirit that is fostered by scientific research.

The scientific work of the laboratory of this hospital has been noteworthy. The vacancy created by the resignation of Dr. Nolan D. C. Lewis in 1935 to become director of the New York State Psychiatric Institute has been filled by the appointment of Dr. Solomon Katzenelbogen, for 10 years on the staff of the Henry Phipps Psychiatric Clinic of the Johns Hopkins Hospital, and associate professor of psychiatry in Johns Hopkins Medical School. Dr. Katzenelbogen is widely known as a scientist and as a valued contributor to the psychiatric literature. He will act as Director of Laboratories and Research.

It is my hope that the publication of the St. Elizabeths Hospital Bulletin may be resumed as a means of making available the results of the investigations, treatment, and research of the staff.

ADMINISTRATIVE DEPARTMENT—OFFICE OF THE ASSISTANT TO THE SUPERINTENDENT

Supplies.—The supplies produced on the hospital reservation, including farm and garden products such as tomatoes, beans, parsley, spinach, etc., included the following: 289,241 gallons of milk, 127,517 pounds of fresh pork, 6,867 dozen eggs, 13,801 pounds of chicken, 13,601 bunches and 68 bushels of beets, 1,501 bushels of cabbage, 41,771 bunches of carrots, 23,047 ears of green corn, 5,000 pounds of grapes, 1,948 bushels of kale, 42,050 heads of lettuce, 72,315 bunches of green onions, 203 bushels of oyster plant, 7,554 bunches of parsley, 873 bushels of sweet potatoes, 29,903 bunches of radishes, 486 bushels of spinach, 327 bushels of squash and 340 single squash, 827 bushels of Swiss chard, 1,725 bushels of tomatoes, 2,200 bunches and 1,774 bushels of turnips.

In addition to the items mentioned, there were manufactured at the hospital 25,216 gallons of ice cream. The farm produced forage as follows: 37½ tons of alfalfa hay, 23 tons of soybean and sudan-grass hay, 45 tons of timothy hay, 20 tons of timothy and grass mixed, 6 tons of wheat hay, 878.6 tons of corn ensilage, and 2,560 bushels of ear corn.

The shoe shop produced 11,235 pairs of various kinds of shoes and slippers, and in addition 2,461 pairs of shoes and slippers were repaired,

237 dozen men's belts, 262 dozen pairs of suspenders, 2,187 brushes, and 234 floor brooms were made in the same department. The broom shop produced 5,579 common brooms and 145 whisk brooms. There were made in the mattress shop 2,872 mattresses and 2,636 pillows. In the bakery there were baked 903,198 loaves of bread, 65,340 pounds of pastry, and 3,324,168 rolls. The laundry washed, dried, and ironed 14,387,256 pieces. The power plant manufactured 545,858,000 pounds of steam; the electrical department generated 3,822,481 kilowatts of electricity; there were pumped 425,397,000 gallons of water, and the main refrigeration plant produced 7,493 tons of ice and refrigeration. All the steam, electricity, ice, and refrigeration used on the reservation were manufactured by the hospital.

In addition, large quantities of clothing for men and women were made in the sewing rooms, tailor shops and occupational therapy departments. The patients on the wards, under the direction of the occupational therapists, made all the dresses furnished the patients, hemmed all the sheets and blankets, assisted in making stand covers, table covers, tablecloths, towels, wove stand covers, rugs, towels, and similar items, and manufactured many hundreds of small toys and recreation items, such as checkerboards, chessboards, cribbage boards, dolls, etc.

Dairy and cow barn.—The Holstein-Friesian herd was again tested for tuberculosis in March and found to be practically free from this disease. While there were two suspects, which were afterwards destroyed, there was no pathological trace of the active disease. The herd, consisting of 252 cows, 87 heifers, 86 calves, and 8 bulls, is one of the largest accredited herds in the country. It is bled twice yearly to determine its freedom from Bang's disease. All animals were negative to the agglutination test.

The output of milk has increased but has not kept pace with the increase of patients. By elimination of the unprofitable cows and careful breeding and feeding the production has been increased until during the past year it averaged more than 12,000 pounds of milk per cow. It cannot be hoped that this output can be materially increased without additional animals. On the other hand, we are confronted with the proposition that there is no further room in the present barns for additional animals. The farm land has been gradually lessened due to taking portions of the land for the construction of buildings, until there is practically none available for new barns and certainly none to be used for raising of feed and for grazing.

The shortage of milk and the necessity for the increase of farm animals, which will require more land, has been confronting the hospital for several years. This is the basis of the estimate for an appropriation for additional land included in the needs of the hospital.

With the increased population the hospital would require a daily production of about 1,000 gallons of milk, compared to the maximum under the present conditions of 875 gallons and a minimum of 600 gallons per day. It would probably require a herd of between 325 and 350 cows to produce the estimated quantity of milk. Of this number, from 60 to 70 would be dry, and in the excessive heat of July, August, and September the production might drop to below 900 gallons of milk daily.

Hogs.—The herd of hogs is in excellent condition and numbers 1,065, which produced 127,517 pounds of fresh pork during the year.

Again we are confronted with the proposition of crowded conditions. The pens are inadequate for the number of pigs raised, resulting in a large loss of little pigs due to smothering in crowding each other in very cold weather. Proper conditions can only be maintained by the acquisition of additional land.

Garden truck.—Conditions for growing vegetables during the past year were better than they have been for several years. For the past several years all of the fall-planted cabbage has been winter-killed, and other crops have suffered from droughts, insect pests, and similar causes. The past year the crops which have suffered most were squash, pumpkins, cucumbers, and other cucurbits, because of the prevalence of the cucumber beetle and the green aphid which worked havoc with the cabbage, kale, collards, and related crops. By intensified gardening with periodic planting we were able to increase materially the output of most of the plants and to keep green vegetables on the tables for the patients during most of the year.

Lawns and grounds.—The grading and resowing with grass seed of the lawns near Oaks D and Toner kitchen have materially improved this part of the grounds. The baseball field was regraded and filled in where low, planted with grass seed, and a pipe railing 300 feet in length placed along the roadside. The large pond south of Center Building has been drained, cleaned out, and greatly improved by repairs and larger flow of water; eight pond lilies in tubs on piers in a circle have been put in, and an island planted with a weeping willow tree and ornamental grasses.

A severe hailstorm visited the institution on April 29, breaking more than 6,000 panes of glass in the greenhouses and destroying many plants.

The hospital used 15,000 plants in flower beds and vases during the year.

Personnel.—The total number of employees on the hospital rolls June 30, 1938, was 1,726. There were 419 appointments during the year, and 390 separations.

During the year 17 of the old employees were retired from the service on account of age and disability.

Administrative promotions (salary rating increases) were granted to 722 employees. Promotions in grade and position were granted to 83 employees.

Among those retired, with terms of service, were:

		<i>Years</i>
Marshall Thomas.....	Junior laborer.....	10
Hallie M. Felker.....	Attendant.....	12
Orion J. Lawrence.....	do.....	13
Leland M. Edelen.....	do.....	13
Tom Taylor.....	Auto mechanic's helper.....	14
Saunders Harrell.....	In charge of garden truck farm.....	15
Elisabeth O. Robinson.....	Occupational therapy aide.....	16
Charles Wilson.....	Farm hand.....	18
William E. Moore.....	Junior laborer.....	18
Sadie E. Dorsey.....	Assistant cook.....	22
Ida B. Slaughter.....	Attendant.....	22
Robert E. Freeland.....	Charge psychiatric nurse.....	31
Frank Swider.....	General mason.....	31
Walber L. Sanders.....	Watch engineer.....	31
Martha A. Langley.....	Forewoman, sewing room.....	32
Lorena D. Cropp.....	Telephone operator.....	35
John F. Jenkins.....	Assistant supervisor.....	41

Rev. H. Waldo Manley, one of the hospital chaplains representing the Episcopal Church, resigned, and Rev. Roy E. LeMoine, of the same church, was appointed chaplain in his place.

During the year one colored graduate nurse and five colored attendants have been detailed to the colored women's service, and three colored male attendants to the colored men's service.

Purchases.—Supplies were ordered in the amount of \$1,900,000. Of this amount, \$888,864 were open market purchases, covered by 275 formal contracts. Included in these contracts was one for Continuous Treatment Building No. 3, \$264,000; Continuous Treatment Building No. 4, \$292,850; and vehicular underpass, \$42,059.

Financial office.—During the year disbursements approved through the financial office amounted to \$3,767,623.48 on a total of 4,353 vouchers. Collections received and deposited totaled \$2,854,970.99.

Chief clerk's office.—During the year 1938 in the stenographic office 18,715 letters were written, 4,077 handwritten notes typed, 16,691 dictaphone cylinders transcribed, and 4,750 notes from the laboratory and 964 histories pertaining to patients, totaling 10,960 pages, were written.

Post office.—Congress enacted legislation that permitted the hospital to reopen the post office, which was closed July 1, 1937, under the name of station L. This office is a great convenience to the patients, to the administration of the hospital, and to the employees.

Fire department.—Regular inspections were made of the whole hospital by the fire marshal for the purpose of protecting it from fire. The 825 soda extinguishers were refilled and tops locked, and also

179 pyrene extinguishers were refilled. The fire siren is tested monthly, and also the fire-alarm system. The fire pumps at the power-house are tested weekly, and the triple combination pumper is tested daily and put in service once a week. Inspections are made weekly with officers and privates of the District of Columbia Fire Department, and occasionally with inspectors from the fire marshal's office. Fire drills are held weekly in various wards of the institution.

During the year there have been 17 alarms, the property damage amounting to \$24. Approximate loss from fires from June 19, 1917, to June 30, 1938, is \$5,858.55, an average of \$278.98 per year.

Continuous Treatment Building No. 3.—Work was started on the construction of Continuous Treatment Building No. 3 on August 25, 1937, and the operation checked approximately 92 percent completed on June 30, 1938. This building will probably be ready for occupancy by October 1, 1938. Its completion will provide 186 additional beds.

Continuous-Treatment Building No. 4.—Plans and specifications were prepared and a contract awarded for the construction of Continuous-Treatment Building No. 4 as of June 30, 1938. The lowest bid was \$292,000, while the appropriation was \$290,000. It was necessary to secure a deficiency appropriation from Congress before the contract could be executed. Arrangements are already made to have the ground broken very shortly after July 1 in order that this building may be completed during the fiscal year 1938.

Continuous-Treatment Buildings Nos. 5 and 6.—Congress appropriated \$580,000 for two additional continuous treatment buildings, which will be numbered 5 and 6. Tentative plans for these buildings have been drawn and it is hoped that the architectural employees can be engaged in the near future to pursue this work.

Construction department.—Plans were drawn and a contract executed for a two-way vehicular underpass under Nichols Avenue. This work is completed and is being used for traffic. The old underpass was built in 1903, before the popular use of the automobile was in vogue. It was narrow and low and dangerous for foot passengers to pass while an automobile was going through at the same time. For a long time we have been apprehensive of possible accident and are greatly relieved that the new underpass has been completed. It provides a maximum of safety, and is high enough to permit the passages of loaded trucks and fire equipment. The old underpass will be used exclusively for pedestrians.

The hospital constructed a concrete and brick pipe tunnel under Dawes and Garfield basements.

Concrete roads, curbs and sidewalks were constructed between the fire engine house and Hitchcock Hall. The road and curb were

rebuilt around the triangle in front of Hitchcock Hall and from there to C building.

The underground passageway extending from B to C building, through the administration building, has been extended to M building, and a dumb-waiter has been installed in the latter building. The food service in M building has been greatly improved by this addition.

Center Building, one of the oldest structures on the reservation, is being renovated. The iron steps and platform at the south entrance to this building have been rebuilt with reinforced concrete, and new rails put in place. The old wooden staircase extending from the basement to the fourth floor has been torn down and a fireproof steel and terazzo stairway, with metal door frames, kalamein doors and concrete slab floors, erected in its place.

The restoration of the porte-cochere at the front entrance to Center Building is under way and this work is approximately 75 percent completed. The plans of the original, which stood for over 40 years, have been largely followed. The construction will add greatly to the appearance of this impressive old building.

One of the reception rooms in the E Nurses Home was renovated and made into an apartment for one of the assistant chiefs of the Training School who will reside in this building.

Among the changes on the reservation during the past year was the razing of the water tank that stood on the administration campus in front of L building. A new tank to replace it was recently erected in the rear of the women's receiving building.

The carpenter shop and the cabinet shop did all the necessary maintenance and repair work for all the buildings in the hospital, such as repair of broken furniture, beds, doors, windows, floors, guards, locks, fly screens, and kitchen, laundry, farm, and group equipment. Many new articles were made for use, such as tables, chairs, bulletin boards, cabinets, stools, and so on.

The tin shop maintained in proper repair the roofs of all the buildings, repaired numerous utensils, kept downspouts in full repair, and did other work incidental to this department.

Guard force.—The guard force has been zealous in its work, being ready to assist in keeping order and preventing losses whenever called upon.

Laundry.—The work of the laundry has increased to such a degree that it is difficult to see how any more pieces could be washed and ironed without either a larger building and more equipment, or putting the employees on two work-shifts. In the recommendations it is noted that in connection with a new building and warehouse, facilities should be made for a larger laundry. The laundry force deserves especial commendation for their efficient work in the face of serious crowding and overloading.

Culinary department.—The dietetic force, like other departments, has been under pressure due to the increased number of patients. In addition to this, the number of special diets has increased disproportionately, reflecting the individualized medical attention given to special nutritional problems among the patients.

The work of extending the cafeteria method of feeding patients continues to receive consideration.

All garbage is being weighed for the purpose of making comparison of the waste. This seems to have resulted in a decrease in the amount of certain classes of food needed and in a marked reduction in the amount of garbage.

In addition to looking after kitchens and the service of food, the dietitians give a regular course including lectures, laboratory work, and kitchen diet work to the student nurses.

During the year the dairy department pasteurized 289,241 gallons of milk, manufactured 25,216 gallons of ice cream, and made 20 gallons of buttermilk daily.

During the year Mr. Elwood Street, Director of Public Welfare of the District of Columbia, was active in organizing an informal association of dietitians and stewards of the various institutions of the District. Several meetings were held in various institutions, and on April 27 Mr. Street, accompanied by a group of 35 members of this group, came to the hospital, visited the kitchens, and had lunch at the employees' cafeteria.

Miss Kirkpatrick, head of the Home Economics Department at the George Washington University, brought a class of students to visit the kitchens and see the service of food.

Miss Barnes, instructor in food and nutrition at the University of Maryland, brought a class in institutional management to the hospital to see the kitchens and the service of food.

Steam connections.—The various gate houses and five of the seven staff cottages have been connected to receive steam from the main power plant, doing away with separate heating devices for each of these buildings.

Glenside Building.—The old isolation building, which had been vacant for some time, having been set aside for isolated patients who may be affected by contagious disease, has been thoroughly renovated and used to house the women tuberculous patients. This change represents a substantial improvement in the facilities for the care of this group of patients.

Radios.—Additional radio connections have been made in the various buildings, extending the use to those patients who could appreciate them.

Automatic telephone.—The hospital automatic telephone system traffic amounted to 1,565,169 calls, the daily average being 4,288 and the hourly average 178.

NEW LEGISLATION

One of the most significant events of the year was the enactment of Public, No. 582, Seventy-fifth Congress, approved by the President on June 8, 1938, reforming the commitment procedures. Until this year, the District of Columbia has had the unenviable distinction of possessing probably the most antiquated and barbaric laws relating to the commitment of mental patients to be found in this country. A situation in which in order to gain admittance to St. Elizabeths Hospital a resident of the District had to be summoned, haled into the criminal court room before a jury, there formally accused of being a lunatic, and forced to listen to the testimony of physicians, relatives, and friends as to his abnormal conduct and intimate details of his life and his family finances, for many years evoked the serious criticism of psychiatrists the country over. After several years of effort, the Medical Society of the District of Columbia this year secured the passage of an act whereby a fairly informal hearing by a commission of two psychiatrists and an attorney is substituted for a court proceeding, a jury trial being provided only on demand. There are practical defects in the law which will presumably be corrected later, but a major step forward has been made, a step which makes it no longer necessary for any humane and sympathetic resident of the District to hang his head in shame when commitment procedures are mentioned. It is my earnest hope that eventually provision may be made for the voluntary admission to the hospital of those patients who recognize the need of hospital care but who have not yet reached such a degree of illness as to constitute committability.

GROWTH OF THE HOSPITAL

In the report of the special committee of 1911, mention is made of the policy to be adopted relative to the growth of the institution and particularly the need of additional land. This problem not only remains with us, but has steadily increased in importance until now it becomes essential that additional land be secured and a recommendation for money for this purpose is made.

In the report of 1911 the committee states:

As an illustration of the importance for outlining a definite policy with reference to the future of the institution, it may be noted that from year to year various bills are introduced into Congress which contemplate taking a little bit of the hospital property here or a little bit there for public use, or running a road through the hospital grounds at this or that point.

Not only have little bits of ground been taken on several occasions, as cited in the report, but at the present time the hospital is con-

fronted with an even more serious situation, as the approaching completion of the so-called Fort Drive, previously authorized, will take a considerable section of the hospital ground. The proposed upper and lower roads from Washington to Fort Washington would have the effect of taking more land. Indeed, plans already projected for this road-building would necessitate the demolition of some of the semipermanent buildings, now occupied by patients, and the moving of staff residence No. 7.

The War Department has requested permission to establish radio towers on one portion of the farm for official use, stating that this was the most advantageous field adjacent to Bolling Field that is available.

The residents of Congress Heights have asked that about 12 acres of land on the Congress Heights farm be transferred to the District, or to the National Park Service of the Department of the Interior, for playground purposes for the children of the neighborhood.

These requests are in addition to the great amount of farm land that has been used in erecting new buildings. Practically all the new construction in the last 20 years was on sites formerly devoted to farming and truck gardening. It can readily be seen that the hospital must oppose any use of its property for other purposes until additional land is secured.

Farm colony.—In the report of the special committee of 1911 it was recommended:

The acquirement of additional land in the way of both farm lands and for buildings for patients, for the construction of a farm colony where the chronic, custodial, and physically well patients could be sent to do the work, is most desirable.

If the farm colony idea was desirable when this report was made, it is much more so at the present time when the population has practically doubled and the available land for farm purposes has been reduced one-third. Therefore, the securing of additional land for farm-colony purposes seems to be urgent.

RECREATIONAL, VOCATIONAL, AND OCCUPATIONAL WORK

Occupational therapy.—The number of patients enrolled in occupational therapy totaled 1,030. The patients working throughout the wards made 13,712 articles, besides the industrial work including 10,087 dresses, 7,666 pillow cases, 28,570 sheets, 1,080 slips, and 22,183 tea towels.

The printing shop, located in the occupational therapy room in the men's receiving building, turned out 221 jobs, totaling 130,684 copies.

Red Cross.—There has been a general increase in the work of the American Red Cross during the year.

During the year they wrote and sent out 5,893 letters and received 4,575 communications. The correspondence offers an excellent opportunity for mental hygiene interpretation and the fact that the patients about whom they are writing come from all over the country and from our island possessions, is indicative of the broad reach and of the many contacts they have made with social agencies and with individuals.

The Red Cross has continued its usual recreation program at the hospital. During the past year they had 88 moving-picture shows, 16 band concerts, 226 parties and entertainments, 363 ward programs, and furnished 4,430 tickets to theaters and ball games which have been donated for the patients.

During the past year the Red Cross authorities transferred all title to the building located at the hospital to the United States Government, and the hospital received a deed in fee which has been recorded in the Office of the Recorder of Deeds, District of Columbia.

The assistance of the Red Cross is invaluable and the hospital's deep appreciation of its services is hereby extended. No finer cooperation could be asked from a private organization than has been freely and enthusiastically given.

Social Service.—The social service report from July 1, 1937, to June 30, 1938, shows the following:

Number of out-patients on rolls July 1, 1937.....	122
Number of out-patients on rolls June 30, 1938.....	140
Average number on rolls per month.....	136
Number of surveys for visit.....	209
Average number of patients worked on each month.....	109

Libraries.—One hundred and thirty-five additional volumes have been added to the medical library, making the total number of books in the library at the present time 15,160. Fifty-nine current medical magazines were received, 20 of them of foreign publication. Some of these are sent to the various departments and the rest kept on file in the medical library. Three hundred reprints were indexed and bound in the patients' library. In addition to the books in the library, we are in receipt, through loan, of books in the Surgeon General's Library and the Library of Congress. The privilege of borrowing books has been greatly extended in keeping with the expanding activities of the hospital, and the physicians of the hospital staff are using the library more extensively in research work. The nurses also made constant use of the library in connection with their instruction course. Students in fields allied to psychiatry and from social agencies in the city and elsewhere availed themselves of the special facilities of the medical library.

One hundred and fifty books were added to the patients' library, making the total collection 16,530. Thirty-three popular magazines and five newspapers, daily and Sunday, were regularly received. Many

periodicals were given by persons interested in the hospital. Newspapers and magazines not suitable for binding are distributed to the wards. Approximately 300 books are drawn daily, two-thirds of them fiction, and there are about 3,600 books in constant circulation.

Training school.—Arrangements are being made to revive and reopen the training school for nurses. The United States Civil Service advertised an examination and requested applicants to file papers. It is hoped that these papers will be rated and certification made to the hospital in the near future. From the list furnished it is desired to select 50 among those who made the highest average for the purpose of starting the school. The courses have been rewritten and the curriculum, not only for the school itself but for the post-graduate course, has been changed.

The senior students in the present school of nursing will complete their course and expect to hold graduation services in October 1938.

Arrangements are under way for making affiliation at Bellevue Hospital or Philadelphia General Hospital for women, and similar arrangements will be made for men.

The importance of a nurses' training school in a large mental hospital can hardly be overestimated. A large and well equipped hospital such as St. Elizabeths is as competent to give a 3-year course (with the aid of certain affiliations) as any general hospital; in addition, the graduates of such a course are imbued from the outset with a psychiatric attitude toward the patient, an appreciation of the patient as a total organism, an attitude all too often lacking in the general hospital graduate. Such training means a graduate who is well fitted to care for the sick, and many of the graduates of this training school have been very successful general-duty nurses. Perhaps more important is the fact that these graduates furnish a supply of nurses for mental hospitals, a supply which experience has shown cannot be amply provided if the general hospitals are depended upon, even if affiliate and post-graduate courses are in operation, as is the case in this hospital. The opposition of the various nursing organizations and State boards of registration to the existence of 3-year training courses in suitably equipped mental hospitals is difficult to understand. The need of psychiatric training of the general-duty nurse is officially recognized (in the District of Columbia mental hospital affiliation is required of the general hospital training schools), and the desirability of raising the care of the mentally ill to general hospital standards is so patent as to be beyond argument. The existence of a training school, the presence of graduate nurses on the wards and the teaching activities of the staff all exert a stimulating action on the morals of the medical and nursing staffs and redound to the benefit of the patients. St. Elizabeths Hospital would be derelict in its duty to its patients and to its obligations to the community (in the present

state of nursing education, at least), if it did not attempt to operate a nurses' training school of standards equal to the best.

NEEDS OF THE HOSPITAL

An estimate of \$1,251,720 for the support, clothing, and treatment of the patients in St. Elizabeths Hospital for the fiscal year ending June 30, 1940, is recommended. This is \$69,120 more than was appropriated for 1939, and based on an average of 1,900 patients and on a 366-day year (1940 is leap year). On June 30, 1938, there were 1,894 patients. The average number during the year was 1,813.7. The number estimated in view of this fact seems very conservative. There was an increase of 301 patients in the hospital on June 30, 1938, as on the same date of the previous year, and it is conservatively estimated that the number to be provided for during 1940 will be 6,186.

In addition to the 1,900 chargeable to the Federal Government and authorized under the Interior Appropriation Act, the numbers who will be cared for in the hospital during the year 1940 are: 3,950 beneficiaries of the District of Columbia; 90 beneficiaries of the United States Veterans' Administration; 140 beneficiaries of the United States Public Health Service; 16 beneficiaries of the United States Soldiers' Home; and 90 beneficiaries of the Indian Bureau. The funds for the beneficiaries of the District of Columbia will be appropriated in the District of Columbia Appropriation Act; for the beneficiaries of the United States Veterans' Administration in the appropriation act for the United States Veterans' Administration; the beneficiaries of the United States Public Health Service will be carried in the appropriation of the United States Public Health Service; the beneficiaries of the United States Soldiers' Home will be paid for from United States Soldiers' Home funds; and beneficiaries of the Bureau of Indian Affairs will be paid for by transfer from funds appropriated for conservation of health among Indians.

The rate estimated for the care of the patients during 1940 is \$1.80 per capita per day, the same as for the past 4 years, notwithstanding the fact that there is some increase in the cost of supplies and that new legislation pertaining to vacation and sick leave and additional holiday has a tendency to increase the cost.

Included in the estimate is \$185,000 for repairs and improvements to buildings and grounds, the same amount that was included in the past several years. Out of this sum must come funds for keeping the various buildings in repair, including plumbing, heating, steam-fitting, plastering, glazing, painting, etc., and for the repair and widening of roads and walks.

The estimates for the fiscal year 1940 contain change of language in two places: The first adds, after the word "purchase" in the sentence, "including not exceeding \$27,000 for the purchase, ex-

change, maintenance, repair, and operation of motor-propelled passenger-carrying vehicles," the language "including one at not to exceed \$1,500." Under the law as it exists at the present time, there is a limitation of \$750 for the purchase of passenger-carrying vehicles. St. Elizabeths Hospital purchased a Cadillac limousine in 1926. This one has had 12 years of service and is practically without value. In order to convey the patients of the hospital who are mentally ill it is advisable to procure a larger car, preferably a limousine type, in order to separate these patients from the chauffeur. The small cars that can be purchased at a cost of \$750 would hardly be large enough for this purpose. Therefore, request is made to include the suggested language so that a larger car of the class named may be purchased.

Another change of language is the insertion of the following:

Provided further, That when specifically authorized by the Secretary, attendance at meetings or conventions concerned with the work of psychiatry, medicine, and other scientific subjects of interest to St. Elizabeths Hospital is authorized, to be payable out of this appropriation.

Similar language is included in other appropriation acts, namely, Education; in appropriations for various branches of the Department of Agriculture; and, we believe, in appropriations for many other Government agencies. Practically all the States have appropriations permitting the superintendents of the various State institutions to attend these meetings or conventions. It is for the best interests of the officers of the various institutions to attend these conventions where there are exchange of ideas and promulgation of new thought upon the advanced work of psychiatry.

The hospital continues to grow. The admissions seem to be increasing, and there is still a shortage of beds. Nine hundred and fifty beds should be provided to cover immediate needs and to include the replacement of the semipermanent group of buildings which were erected in 1918, with an estimated life of from 15 to 20 years. This semipermanent group which has 530 beds is in a more or less dilapidated condition and not thoroughly fireproof. The cost of repair is increasing, and the hazard from fire is considerable. I consider this recommendation a pressing urgent one.

The increase in population, 300, during the past year more than offsets additional beds previously authorized. At the present time the hospital has no available beds and it is necessary to put additional beds on various wards to take care of the new patients as received.

In a report of the National Resources Committee for May 1938, on *The Problems of a Changing Population*, it states as follows:

More than half the occupied hospital beds in this country are assigned to patients suffering from mental diseases. The social, economic, and medical

aspects of these diseases, whereof the causes are still largely unknown, are very serious. They deserve the most intensive study.

The report well states the future of mental institutions, and shows that provision must be made for additional beds, as well as for active research.

Two of the continuous-treatment buildings are to be located adjacent to the continuous-treatment kitchen where provision has been made for the preparation and service of food; dining rooms will have to be provided and a tunnel connection to the kitchen so that the food may be brought to the building. It is planned to have cafeteria service in the dining rooms attached to these buildings. The same condition applies to the three buildings that are suggested to replace the semipermanent group.

Based on bids received on the last buildings, it is believed that \$350,000 will be required for each of these buildings, which will have a slightly increased number of beds. The first buildings of this class erected contained 162 beds; the new buildings, it is estimated, will have 190 beds.

There is an estimate of \$140,000 for one additional 750-horsepower boiler with the necessary utilities. The hospital recently installed three 750-horsepower boilers, which were sufficient for its needs at that time. Space was left for an additional boiler, which would be required when the new buildings were erected. The growth of the hospital requires the additional boiler as soon as arrangements can be made for its erection.

Seven hundred fifty thousand dollars has been estimated for a building for storeroom, warehouse, laundry, and industrial shops, including preparation of plans and specifications, advertising, supervision of construction, and equipment. The present storeroom was built more than 30 years ago. Since that time the population has very nearly tripled, but no change has been made in the storeroom and warehouse. The present storeroom, with cold-storage equipment, is practically out of date and the storage facilities are insufficient to care for adequate quantities of current supplies. In order properly to house supplies that must be cared for and regularly issued to the various buildings and industries, all sorts of out-of-the-way places have been utilized. The basements of many buildings housing patients have been used for storing furniture. The District Fire Department properly objects to this procedure. It is difficult to give proper protection to articles in all classes of buildings, and there is possibility of shrinkage.

The hospital has a shoe-manufacturing department, with 2 employees and about 60 patients, which makes all of the shoes used in the institution except those purchased from personal funds of patients. A room under the detached dining room is used for that

purpose. The manufacture of shoes is increasing and more room is required. A proper place with sanitary working conditions should be provided, and it is contemplated to have space available in the new store and warehouse building when authorized.

When the present laundry building was erected, the total amount of material washed and laundered each year was about 3,000,000 pieces. This has increased until during the past year over 14,000,000 pieces were washed and laundered. It has outgrown the original building; small additions have been put on each side, but it is necessary to furnish more room. It is contemplated, if a new building is authorized, to make space at one end of the first floor of this building for the laundry. Such authorization is urgently recommended.

There is an estimate of \$950,000 to purchase farm land, to construct buildings to house patients who would work on the farm, to construct buildings to house employees, for the farm animals, including dairy, piggery, poultry plant, a building for pasteurizing milk, making ice cream, and other necessary farm buildings, including expenditures for the purchase of land, preparation of plans and specifications, advertising, and supervision of construction.

The hospital consists of four plots of land, in all about 800 acres. The last land purchased for hospital use was in 1891. At that time the hospital had about 1,500 patients, and over 600 acres were used for farm and garden purposes. The hospital, while originally isolated some miles from the center of the city, at the present time on account of the growth of the city and the use of various forms of traffic, is now adjacent to the city and is surrounded by a growing population. The dairy and piggery are in proximity to buildings occupied by patients, and the dairy is adjacent to Nichols Avenue, a thoroughfare running through this section of the city; both the dairy and piggery are the subject of a good deal of complaint on the part of the inhabitants of this section.

One part of the farm is located about a half mile from the main site, in what is known as Congress Heights. Certain groups have recommended that a portion of this ground be turned over to the National Capital Park and Planning Commission for playgrounds for children, and that another part be turned over to the District of Columbia for streets and roads. Parts of this same site have been taken by the city for widening streets. It will readily be seen that the hospital must oppose all taking of land until additional land is obtained.

Another plot of the hospital is about four and a half miles from Washington; a portion of it is on low land, sometimes under water.

It is believed desirable to obtain between 5,000 and 6,000 acres of land, to concentrate all farm projects in one place, increase the size of the dairy herd, the piggery, and the poultry farm, and build about

6 cottages, housing 40 patients each, on this site. This arrangement would permit an increased number of patients who would derive the therapeutic benefits of healthful outdoor occupation. This also would prove an economic arrangement in that the hospital would be able to secure sufficient milk for all purposes, to increase the quantity of pork products and probably to cure pork products, thus reducing the quantity of ham, bacon, and shoulder to be purchased, and also increase the quantity of poultry products, such as fowl and eggs.

The hospital has no site in view, but preliminary studies indicate that such a site could be secured within from 10 to 20 miles from the main plant.

STAFF CHANGES JULY 1, 1937, TO JUNE 30, 1938

The following appointments were made during the year:

Superintendent: Winfred Overholser. Date of taking office, October 4, 1937.

Psychiatric Residents: Irma H. Belk, Marion S. Love, Helen V. Patterson, Burnell V. Reaney, Josiah T. Showalter, and Charles E. Vigue.

Internes: David Brezin, Bernard A. Cruvant, John W. Thomas, and Sigmund Weiss.

The following resignations took effect during the year:

Assistant Medical Officer: Helen Yarnell.

Psychiatric Residents: Hack U. Stephenson, John M. Usow, Joseph T. Kaminskas, and Samuel Allentuck.

Internes: William F. Murphy, Arnold H. Ungerman, William H. Vicary, Moorman P. Prosser, Wallace E. Nissen, and Nathan N. Root.

PUBLICATIONS

Overholser, Winfred, Superintendent:

Later Criminal Careers, by Sheldon and Eleanor Glueck. (Book Review). Boston University Law Review, Vol. 17, No. 4, Nov. 1937, p. 924.

The Mentally Ill in America, by Albert Duetsch. (Book Review.) American Bar Association Journal, Vol. 23, No. 12, Dec. 1937, p. 982.

Legal and Administrative Problems, Mental Hygiene, Vol. 22, No. 1, January 1938, Page 20 (In Symposium, The Challenge of Sex Offenders).

The Early Treatment of Mental Disorders. (Presented before the Wayne County Medical Society, Detroit, Mich., April 27, 1938). (Mimeographed.) 23 pages.

Mental Hygiene and the Problems of Human Nature. (Address given under the auspices of the Mental Hygiene Committee, Michigan Medical Society, Detroit, Mich., April 27, 1938). (Mimeographed.) 10 pages.

The Rôle of Psychiatry in General Medicine. (Smith-Reed-Russell Lecture, Feb. 24, 1938). The Diplomat, Vol. 10, No. 5, May 1938. Page 164.

The Mental Hospital of Yesterday and Today. Medical Annals of the District of Columbia, Vol. 7, No. 5, May 1938. Pages 137-144.

Ten Years of Co-operative Effort. Journal of Criminal Law and Criminology, Vol. 29, No. 1, May-June 1938. Pages 23-36.

White, William A., (late Superintendent):

William Alanson White: The Autobiography of a Purpose. New York, Doubleday, Doran and Company, Inc. 1938. (Book, 293 pages). (Posthumous).

Karpman, Ben, Senior Medical Officer:

Crime and Adolescence. Mental Hygiene, Vol. 21, No. 3, July 1937. Pages 389-396.

"The Kreutzer Sonata": Problem in Latent Homosexuality and Castration. Psychoanalytic Review, Vol. 25, No. 1, January 1938. Pages 20-48.

Fong, Theodore C., Senior Medical Officer:

Study of Mortality Rate and Complications Following Therapeutic Malaria. Southern Medical Journal, Vol. 30, Nov. 1937. Pages 1084-1088.

Hoffman, J. L., Assistant Medical Officer:

Intercranial Neoplasms: Their Incidence and Mental Manifestations: Study Based on Clinical and Autopsy Records of 2,000 Patients of St. Elizabeths Hospital. Psychiatric Quarterly, Vol. 11, No. 4, October 1937. Pages 228-233.

Lebensohn, Z. M., Assistant Medical Officer:

Present Status of Metrazol Therapy of Schizophrenia. Medical Annals of the District of Columbia, Vol. 7, February 1938. Pages 33-41.

During the period of 7 months intervening between the death of Dr. White and the assumption of office by the present incumbent, Dr. Roscoe W. Hall, Clinical Director, served as Acting Superintendent. The affairs of the hospital were wisely administered by him during that interval, and he turned over to the present Superintendent a well-organized and well-running institution. I am deeply appreciative of his fine work in what must have been a difficult period. Nor can I pass without a word of tribute to Mr. Monie Sanger, Assistant to the Superintendent, who for nearly 33 years has handled most efficiently and ably the large bulk of administrative and budgetary detail of the institution.

It would be pleasing if I might express thanks by name to the many faithful and devoted employees and officers of the hospital whose loyal labors have contributed so greatly to the successful operation of the hospital, but space forbids. Saint Elizabeths Hospital is justly proud of its personnel and their fidelity to the welfare of the hospital and its patients.

The Board of Visitors has been most helpful and interested, and to them individually and as a group I express my appreciation of their support and assistance.

Finally, I desire to express to Secretary Ickes my deep appreciation of the trust he has reposed in selecting me to head a great hospital. His support and advice, whenever I have called upon him, have been prompt, firm, and most helpful. With the cooperation of the officers and employees of the hospital, and the continued support and assistance of the Board of Visitors and Secretary Ickes, it will be my endeavor to continue Saint Elizabeths Hospital in its present status as an object of justifiable pride to the Department of the Interior and the Government of the United States.

HOWARD UNIVERSITY

Mordecai W. Johnson, *President*

THE YEAR 1937-38 was the seventh of the 20-year program for Howard University approved by the Government. During this period two major buildings were under construction. The new library building, costing \$1,105,000, was nearing completion. The new men's dormitory building, costing \$525,000, is under construction, representing the first major effort to improve the living conditions of university male students since its founding. Funds for these projects were provided by the Federal Emergency Administration of Public Works.

Two additional divisions of the university receive accreditation.—During the year two additional divisions of the university were examined and accredited by leading educational authorities. The departments of engineering in the school of engineering and architecture were accredited after examination by the Educational Committee of the Engineers Council for Professional Development. The division of oral hygiene in the college of dentistry was accredited by the regents of the University of the State of New York.

Students.—During the year 1937-38 Howard University's enrollment increased 132. The total enrollment of 2,240 students was drawn from 42 States and 17 foreign countries. Of the 89 students entering the regular freshman classes in medicine, dentistry, law, and religion, 64 or 72 percent entered with college degrees. Two hundred and sixteen, or 71 percent of the 305 students in these 4 professional schools were degree-holding students. In the entire institution of 2,240 students 564 or 25.2 percent were persons holding one or more advanced degrees.

Further advance in clinical medicine.—By the help of funds from the General Education Board the department of medicine was reorganized under a full-time head. The department of surgery, reorganized under similar circumstances, during the previous year, greatly increased the efficiency of its work, reducing its mortality from 6.5 to 0.03 percent.

A postgraduate course in venereal-disease control was introduced and supported by a grant of \$7,500 from the United States Public

Health Service, in order to train physicians in venereal-disease control, particularly in the Southern States. Two grants totaling \$1,000 were made to encourage investigation and testing of tuberculosis.

The graduate school.—The graduate school enrolled 326 students during the year, an increase of 42 over 1936–37. The rapid development of high schools in the South and the accrediting movement of high schools and colleges by the Southern Association of Secondary Schools and Colleges have increased the demand for teachers with graduate training. Young State colleges have been urged to establish graduate work when most of them are still in need of adequate resources for their college work. The Association for Colleges and Secondary Schools for Negroes, at its annual meeting in New Orleans, was concerned that there should be no widespread movement toward the hasty establishment of graduate work in institutions not prepared to do it well. The General Education Board undertook a study of all the factors involved. It was found that six institutions were already undertaking graduate work in some form. Howard University is the oldest of these institutions in the development of graduate work, the largest in point of enrollment, and the most advanced in the matter of resources for further development. It stands out as the most promising center for graduate instruction in the entire field.

During the current year graduates from 59 institutions came to Howard University for graduate instruction, 83 percent of them from the South. It is of the utmost importance to many States that steps be taken to place the graduate work of Howard University on a sound and competent basis. Such a development can mean much to the Negro race.

Faculty publications and research.—The faculty of the university during the current year put forth 8 books, 78 scientific and scholarly articles, and 26 book reviews. Among these contributions was the continuous publication of the *Journal of Negro Education*, now one of the ablest publications in the United States in the field of education. Much of the research and publication of the faculties has significant practical bearing upon the life of the people. The department of pharmacology, for example, has discovered through careful research that picrotoxin, which was formerly considered merely a laboratory curiosity, is an efficient antidote for what would otherwise be a fatal poisoning by the barbiturates, now in widespread use as sleep-producing drugs. As a result of the department's research in this field picrotoxin has received international approval as the best known available drug to combat poisoning by the barbiturates.

Outstanding needs of the university.—The outstanding needs of the university, made increasingly clear by the work of the year, were: (1) An increase in the number of teachers in the graduate school and in the clinical branches of medicine; (2) an increase of 26 in the number

of mature teachers of professorial rank; (3) the sum of \$100,000 to make important supplements to the gravely deficient book collection in our library; (4) the doubling of funds for scholarship and student aid, especially for teachers in the South, who may not otherwise find it possible to pursue the graduate work which they need to increase their efficiency; (5) proper organized relationship with the Freedmen's Hospital so as to enable the school of medicine to operate on a sound basis; and (7) increased funds for at least that minimum of research which is necessary to maintain a living mind in the members of the teaching staff.

STUDENTS

University enrollment, 1937-38.—The total enrollment of Howard University (see table following) for the year 1937-38 was 2,240, of whom 1,119 were men and 1,121 were women, as compared with an enrollment of 2,108 for 1936-37, of whom 1,108 were men and 1,000 were women. This enrollment represents a net gain of 132 students, or 6.2 percent. It represents also a total gain of 614 students since the low point of the depression in 1933-34.

Summary of Students Enrolled in Howard University for the Years 1937-38 and 1936-37

Division of the university	Net enrollments						Total gain	Total loss
	1937-38			1936-37				
	Total	Men	Women	Total	Men	Women		
THE COLLEGES								
College of liberal arts.....	1,332	586	746	1,244	593	651	88	-----
School of engineering and architecture.....	50	50	0	52	52	0	-----	2
School of music.....	98	31	67	75	28	47	23	-----
Graduate school.....	326	121	205	284	110	174	42	-----
Total.....	1,806	788	1,018	1,655	783	872	153	2
PROFESSIONAL SCHOOLS								
School of religion.....	23	20	3	21	21	0	2	-----
School of law.....	74	72	2	70	68	2	4	-----
School of medicine:								
College of medicine.....	154	142	12	139	133	6	15	-----
College of dentistry.....	48	41	7	38	38	0	10	-----
College of pharmacy.....	29	29	0	31	26	5	-----	2
Total.....	328	304	24	299	286	13	31	2
Total in regular courses.....	2,134	1,092	1,042	1,954	1,069	885	184	4
Special students in music, religion, law, dentistry.....	130	38	92	162	44	118	-----	32
Total.....	2,264	1,130	1,134	2,116	1,113	1,003	148	-----
Less duplications.....	24	11	13	8	5	3	16	-----
Grand total (net).....	2,240	1,119	1,121	2,108	1,108	1,000	132	-----

The increase in enrollment affected all three of the major divisions of the university, undergraduate, graduate, and professional. An increase of 15 appeared in the college of medicine. This is the first

substantial increase in the enrollment of medicine since the beginning of the depression.

Geographical distribution.—Of the regular students enrolled for the school year 1937–38, 95.5 percent came from the continental United States and 4.1 percent from without the borders of the United States. The percentage of students coming from the District of Columbia was 25.2 percent.

Forty-two States sent 2,047 candidates for degrees in 1937–38 as compared with 40 States sending 1,871 candidates for degrees in 1936–37. The regional distribution of candidates for degrees is as follows: From the North, 509 students as follows: New England, 58; the Middle Atlantic States, 302; the East North Central States, 101; the West North Central States, 48. From the South, 1,525 students as follows: The South Atlantic States, 1,263; the East South Central States, 151; and the West South Central States, 111. From the West, 13 students as follows: Mountain States, 4; Pacific States, 9.

Sixteen foreign countries sent 87 candidates for degrees during the school year 1937–38 as compared with 15 foreign countries with a total of 83 candidates for degrees in 1936–37. As usual, the largest group of foreign students (44) came from the British West Indies. Nine came from the Virgin Islands, eight from British Guiana, and eight from Panama.

Students of graduate caliber.—Two of the professional divisions, namely, pharmacy and dental hygiene, receive students on the basis of regular college entrance requirements. Medicine, dentistry, law, and religion require definite amounts of college work. Of the 89 students entering the regular freshman classes of medicine, dentistry, laws and religion in 1937–38, 64 or 72 percent, entered with college degrees. Two hundred sixteen, or 71 percent, of the 305 students in these four professional schools are degree-holding students. Of the 2,240 students in the entire university 564, or 25.2 percent, are persons holding one or more advanced degrees as compared with 429, or 23 percent, in 1936–37.

Scholarships and student aid.—Scholarships within the university continued to be administered on the basis of an allotment of 7½ percent of all student fees, as provided by the trustees of the university.

The committee on scholarships and student aid acted upon 1,250 applications for assistance. Four hundred forty-five students, or 19.4 percent of the student body, were awarded tuition or work scholarships. Of these 204 were helped by the National Youth Administration, at an average of \$112.22 per student. The total amount available for scholarships from all sources was \$59,995.65.

Concerning the 1,250 applications for assistance the chairman of the general committee of scholarships states that "about 2 percent

of the applicants were judged by the committee as being not in sufficient financial need to receive aid from the university. More than 98 percent of the applicants are in need of aid in order to enable them to attend Howard University. Even those assisted by this committee receive as a rule, only a portion of their university expenses. It is clear that Howard University must find additional aid for needy students."

GRADUATES

Number and distribution.—The following table exhibits the number of graduates from each division of the university during 1937-38. It shows that there were 250 graduates. These came from 31 States and the British West Indies. The total of 250 students graduating in 1937-38 represents an increase of 24 graduates as compared with the 266 in 1936-37. There were 134 male graduates and 116 women graduates as compared with 127 and 99 respectively, for the year 1936-37.

Honorary degrees.—Three honorary degrees were conferred at commencement in June 1938. The degree of doctor of music was conferred upon Marian Anderson, contralto, Philadelphia, Pa.; and the degree of doctor of laws, upon Dwight Oliver Wendell Holmes, President of Morgan College, Baltimore, Md., and J. R. E. Lee, President of Florida A. and M. College, Tallahassee, Fla.

Total number of Howard University graduates.—The total number of graduates of Howard University is now 10,266. Of this number the registrar has over 6,000 correct addresses in 43 States, the District of Columbia, and 15 foreign countries, classified alphabetically by States, cities, sex, schools, and classes.

Summary of Students Graduated by Howard University for the Years 1937-38 and 1936-37

Divisions of the university	Graduates					
	1937-38			1936-37		
	Men	Women	Total	Men	Women	Total
THE COLLEGES						
College of liberal arts.....	54	82	136	44	64	108
School of engineering and architecture.....	4		4	1		1
School of music.....	3	3	6	1	2	3
Graduate school.....	21	24	45	12	24	36
Total.....	82	109	191	58	90	148
PROFESSIONAL SCHOOLS						
School of religion.....	6		6	7		7
School of law.....	14	1	15	15	2	17
School of medicine:						
College of medicine.....	22		22	34	1	35
College of dentistry:						
4-year course.....	7		7	11		11
Dental Hygiene.....		6	6		5	5
College of pharmacy.....	3		3	2	1	3
Total.....	52	7	59	69	9	78
Grand total (net).....	134	116	250	127	99	226

THE TEACHING STAFF

Objectives.—In the development of the 20-year program, the trustees of the university have kept in mind several major objectives in relation to the teaching staff. (1) Their first objective has been to increase the number of teachers so as to establish the proper ratio between teachers and students. (2) They have undertaken to increase the number of full-time teachers and gradually to shift the major responsibility for instruction in every division of the university upon the shoulders of teachers giving their full-time attention to the work of education. (3) The establishment of a salary scale for each rank of instruction, assuring a minimum income of a definite amount to each teacher in that rank and moving toward such an average for that rank, and especially for the rank of professor, as will enable the teacher concerned to devote his full time and attention to his work. (4) Advancements in rank and salary on the basis of merit objectively determined. (5) The gradual maturing of the staff of the university so as to have in the topmost rank of professors and constituting at least 40 percent of the entire group of teachers of the university, mature men and women of sound scholarly habits. (6) The establishment and publication to the administrative and teaching staff of sound tenure regulations, so as to afford administrative officers and teachers a sense of security in their positions, and so as to make clear the conditions under which the presumption of permanent tenure may be established. (7) The setting up of retirement regulations on the basis of which administrative officers and teachers of the university having arrived at a certain age, may be assured of retirement with a substantial proportion of their annual income available thereafter. (8) the provision of competent educational assistants, adequate equipment and supplies to enable the teacher to use his intellectual powers to the maximum advantage. (9) The maintenance of freedom of teaching.

No one of these major objectives has been neglected. Substantial progress has been made in relation to each one of them.

There were 258 members of the teaching staff for 1937–38, of whom 148 were full-time teachers and 110 were rendering part-time service, representing together a full-time equivalent of 166.43 teachers. In 1928, when the trustees began to put the 10-year program into operation, there were 161 teachers in the university, 81 of them being on full-time service and 80 on part-time service. It will be seen that during the intervening period the total number of teachers has been increased by 60 percent and the total number of full-time teachers has been increased by 76 percent. This means that the teaching load in the college of liberal arts, for example, has been reduced by one-half, so that each student may now receive approximately twice as much of the teacher's time as in 1928. It means, further, that 90 percent

of the work of instruction is now done by teachers who are devoting their full time to education.

There are three major points of strain in the university at which the number of teachers now at work is insufficient. These are (1) the graduate school, (2) the clinical branches of medicine, and (3) the school of religion. The latter, of course, must be met from private sources.

The maturity of the staff.—On the basis of the 20-year program, the present staff of Howard University should have the following distribution: Professors (40 percent) 66; associate professors (10 percent) 16; assistant professors (20 percent) 33; instructors (30 percent) 49. The university is slightly beyond the halfway mark in the number of mature professors. Twenty-six such men and women are now needed. The choosing and appointment of these 26 persons, by advancement and outside selection, constitute the most important work now waiting to be done at the university.

Faculty publications.—One of our professors in the college of liberal arts has made a careful study of the scholarly productions of that faculty over a period of years, showing in brief that they have published 56 books and monographs, 469 articles and papers, 141 book reviews, and 86 other creative contributions, such as poetry, plays, paintings, etc. This is a highly favorable picture. In the discussion of his result, however, the writer makes the following significant comment:

It should be kept in mind that it has only been within the last 10 years that the teaching load in the college has been sufficiently reasonable to allow time and energy for scholarly productivity. At the present time, for example, the average teaching load is 222.5 clock hours as compared with a load twice as heavy 10 years ago. The reduced teaching load is reflected in the fact that approximately 85 percent of the contributions made by teachers during their tenure at Howard have been produced during the past 7 or 8 years.

The publications of the university faculty during the year 1937-38 were as follows: 8 books, 78 scientific and scholarly articles, 26 book reviews.

The practical bearing of faculty research.—In the department of pharmacology one member of the staff has been interested in research on the action of barbiturates (a large family of sleep-producing drugs). Within recent years the drug market has been flooded with sleep-producing drugs belonging to this family. In many States these drugs may be bought without prescription. During the past few years such drugs have been widely used in suicide attempts. Also, cases of accidental poisoning have resulted from their use. This member discovered that picrotoxin, which was formerly considered merely a laboratory curiosity, is an efficient antidote for what would otherwise be a fatal poisoning by the barbiturates. As a result of

his research in this field, picrotoxin has received international approval as the best known available drug to combat poisoning by the barbiturates. The antidote is now available on the market for this purpose.

THE GRADUATE SCHOOL

General trends.—The graduate school continued the unbroken trend of increased enrollment which it has sustained since 1929–30 throughout all the years of the depression. This has been the most significant enrollment development in the university during these years. It has been accompanied by an equally significant movement of steady increase in the number of students of graduate caliber registered in the major professional schools of the university.

This steady increase in graduate enrollment has been of a national character. This year the students came from nearly three-fourths of the States of the Union. While the students have come predominantly from colleges and universities established for Negro youth, they have increasingly come also from many of the long-established colleges and universities in the North and West.

Two major developments designed to have a very helpful effect upon the graduate work appeared during the year. The new library building is about finished and will be ready for occupancy during the first semester of 1938–39. It will provide graduate reading rooms, seminar rooms, and cubicles for individual study in the stacks. The new men's dormitories, now under construction, are so arranged as to permit an entire section to be set apart for graduate students.

Enrollment.—The total enrollment of graduate students for the year 1937–38 was 326. This represents a net increase of 42 students over the enrollment of 284 students in 1936–37. One hundred ninety-six of these students were registered in the first semester, 218 in the second semester, and 88 in the summer school. One hundred twenty-one of the total were men and 205 were women.

An average of 76 of these students were giving their full time to their studies, that is, from 12 to 15 and more semester hours of work during the first and second semesters of the regular school year. There was an additional average group of 78 students who were giving half-time and more to their graduate studies as compared with 52 such students during the preceding year. Altogether the graduate enrollment represented a full-time equivalent of 233 students, as compared with 24 students in 1936–37.

Sources of students.—The 326 graduate enrollment came from 32 States and 1 foreign country. It will be seen that 272, or 83 percent, came from the Southern States.

These students received their first degrees from 59 colleges and universities before coming to Howard University. Twenty institutions in Northern and Western States sent 31 students as compared with 20 institutions in Northern and Western States sending 22 last

year. These institutions include some of the charter members of the Association of American Universities. Thirty-seven institutions for Negro youth sent 295 students, or 90 percent of the entire enrollment. Thirty-four of the students held master's degrees as compared with 23 and 7 the 2 previous years. Seven professional degrees were listed among the students, and one doctor of philosophy.

Department of instruction and faculty.—The 326 students for the year 1937-38 did their work in 18 departments of instruction. One hundred thirty-eight, or 42 percent, of the students in the graduate school did their work in education, psychology, and philosophy. Ninety, or 27 percent, did their work in the social sciences of economics, sociology, social work, history, and political science. Thirty-eight, or 11 percent, did their work in the natural sciences, in mathematics, including bacteriology, botany, zoology, chemistry, and physics. Fifty-two, or 15 percent, did their work in English, German, and romance languages.

Seventy-two teachers participated in graduate instruction during the year.

Social work.—Social work was undertaken for the first time in the academic year 1935-36, under the direction of the department of sociology. There were 24 students enrolled in 1935-36; 28 in 1936-37; and an average of 34 for the current academic year. The publication of a special bulletin of the department of social work is to be issued during the coming year. Plans for the development of medical social work have been undertaken by the department.

Degrees conferred.—At commencement 45 graduate degrees were conferred on 18 men and 27 women. Thirty-five received the degree of master of arts and 10 the degree of master of science. The number indicates an increase of 9 in the group of graduates over the year 1936-37.

The future of graduate work.—The rapid development and accreditation of public high schools and colleges for Negroes in the States of their majority residence within the last 10 years have created an acute and growing need for mature teachers with thoroughly competent training on the graduate level. The soundness of the educational structure throughout these States depends primarily upon the calibre of graduate instruction which is made available to meet this situation.

Howard University is the most promising center for such graduate work in the entire area. The steady increase in the enrollment in the graduate school from 43 in 1926-27 to 284 in 1936-37 is an index both of the rapidity with which the need has developed and of the remarkable opportunity which now confronts Howard University in this field. It is of the utmost importance to the States of the Negro's majority residence that all possible steps now be taken to place the graduate work at Howard University on a sound and thoroughly

competent basis so as to enable the university to select and to train on the graduate level young men and women of unusual promise. In such a program certain immediate steps are urgent: (1) The book collection of the university should be doubled within a period of 5 years; (2) special scholarship and fellowship funds for graduate students should be provided; (3) funds should be available for at least the minimum of research necessary to the staff who teach graduate students; (4) salaries of the mature teachers on the staff of the university should be so increased as to enable them to give their entire time to their work without worry; and (5) the number of such mature, well-paid teachers should be immediately increased.

THE COLLEGE OF LIBERAL ARTS

Enrollment.—The college of liberal arts enrolled 1,332 students in 1937–38. This is the largest enrollment in the history of the college. It represents an increase of 88 over the enrollment of 1936–37, and an increase of 176 in the enrollment of 1934–35, which was the first year of the merger of the college of education with the college of liberal arts. These students were at work in 24 departments of instruction.

The students in the college came from 38 States and the District of Columbia and from 12 foreign countries.

The graduates.—The graduates of the college of liberal arts for 1937–38 numbered 136, as compared with 109 in the previous year.

The faculty.—There were 88 members of the faculty of the college officially in service during the academic year 1937–38. Of these, 81 were full-time teachers and 7 were on part-time.

The following significant facts about the faculty of liberal arts are taken from a study made during 1937–38 by Dr. Charles H. Thompson, head of the department of education:

(1) Of the 21 full professors, 70 percent have the doctorate degree, or more, and no full professors possesses less than 2 years of graduate training.

(2) Of the 15 associate professors, 9, or 60 percent, have 2 or more years of graduate training; and only 1 (an art teacher) has less than 2 or more years of graduate training.

(3) Of the 19 assistant professors, 8, or 42.1 percent, have doctorate degrees; 7, or 36.8 percent, have two or more years of graduate training.

(4) Of the 29 instructors, 28, or 97.6 percent, have 1 or more years of graduate training—the median training being the master's degree with additional graduate training.

(5) Taking the faculty as a whole, 39.7 percent have doctorate degrees, or more; 75.8 percent have 2 or more years of graduate training; and the only persons (three) who do not have some formal graduate training are the special cases already noted.

(6) The members of the faculty of the college of liberal arts have put forth 752 scholarly publications, including 56 books and monographs, 469 articles and papers, 141 book reviews, and 86 other creative contributions such as poetry, plays, paintings, etc. Eighty-five percent of the contributions made by teachers during their tenure at Howard have been produced during the past 7 or 8 years.

Faculty publications during the year 1937-38 included 5 books, 2 chapter contributions to books, 47 articles published in scholarly periodicals, and 24 book reviews.

MILITARY SCIENCE AND TACTICS

Enrollment.—The enrollment of the department of military science and tactics during the current academic year was 329 the first semester and 323 the second semester, as against 215 and 312 respectively for the last year. Forty-seven students from Howard University attended the R. O. T. C. camp at Fort Howard, Md., June 12 to July 23, 1937, and all students successfully completed the course.

Unit rated as excellent.—Colonel Richard Wetherhill inspected the R. O. T. C. unit May 23 to May 27, and attended its R. O. T. C. Day on June 3, 1938. His report is as follows:

General rating of the unit—"Excellent."

Credits allowed.—By vote of the faculty of the college of liberal arts, the advanced courses in military science and tactics will hereafter receive $1\frac{1}{4}$ hours of academic credit per semester. The basic courses continue on a par with physical education and receive no academic credit.

Commissions awarded.—Ten students were awarded commissions as second lieutenants of Infantry, Officers Reserve Corps, United States Army. Four additional students will receive certificates of eligibility for commissions as second lieutenants of Infantry, Officers Reserve Corps, upon attaining 21 years of age.

THE SCHOOL OF ENGINEERING AND ARCHITECTURE

Accreditation.—In October 1937 the departments of engineering were accredited by the Engineers' Council for Professional Development and placed on the list of nationally recognized schools of engineering.

Enrollment.—Instruction was given to 75 students, 50 of whom were enrolled for degrees in engineering and architecture. Three-fourths of the students were from areas outside of the District of Columbia.

Graduates and their employment.—Four students were graduated in June 1938, three from the department of civil engineering and one from the department of mechanical engineering. One student was graduated with honors. Two students were employed immediately upon graduation. Graduates receiving work appointments during the year included one instrument man for a municipality, a supervising engineer for a state engineering department, a division engineer for a municipality, a tool designer for a manufacturer of aeroplane parts, a construction engineer, engineer inspector and power plant engineer, and a manager for a federal housing project. One graduate was appointed to a teaching position in a land-grant college.

Faculty.—The faculty of eight full-time members included one professor, one associate professor, one assistant professor and five instructors. There were four visiting lecturers during the school year. One faculty member was on sabbatical leave of absence for post graduate study. Eighty-five percent of the faculty have earned the master's degree or its equivalent, while one member has earned the degree of doctor of philosophy.

Two thirds of the faculty are registered professional engineers or architects. A number of the faculty members hold Civil Service status with high classification.

One faculty member applied for a patent on an optical miller, a device which already had attracted the interest of tool manufacturers.

New equipment.—Through a special grant from the Government, several important pieces of laboratory equipment, including a steam turbogenerator set, Diesel engine, air-conditioning unit, a theodolite and a precise level, were acquired.

Needs.—Additional laboratory apparatus is needed for developing the work in electronics, materials testing, and power plant science. Three new teachers in engineering and architecture are necessary for relief regarding the heavy teaching loads and for developing courses in power plant operation and institutional maintenance. The departmental housing facilities are inadequate for present enrollment, which is double the normal capacity of the building. A new building designed for engineering and architecture should be acquired at an early date.

SCHOOL OF MUSIC

Number and distribution of students.—The school enrolled 222 students during the year, as compared with 223 for the previous year. Ninety-eight of these students were registered in the regular degree courses. One hundred and twenty-four were registered in the junior department. These numbers represent an increase of 23 in the regular degree courses. This is the largest enrollment of students prepared to pursue degree courses in the history of the school of music. By reason of the vigorous development of the enrollment in degree courses the numbers in the junior department during the current year were restricted. It is the purpose of the school to continue this restriction and to focus its attention on the selection of students of outstanding musical talent capable of developing in a limited time to the conservatory level.

Faculty.—There were 16 members of the faculty during the year, as compared with 13 last year. Ten of these gave full time to the work, while six others gave the full-time equivalent of two teachers. No major appointment was made during the year. One member of the faculty is on leave and is now appearing at the Drury Lane Theatre in London, England. Four members of the faculty appeared in 14

recitals in 13 States. Two members of the faculty are engaged in advanced study.

Graduates.—Six students were graduated at commencement time. One received the degree of bachelor of music; five received the degree of bachelor of school music.

Outstanding events of the year.—The concert series this year was an outstanding success. The series was unusually well attended and was well managed so as to yield a net income of \$1,330 as a basis for the series of the coming year.

The theory department presented its second annual recital of original music composed and performed by students, on a much larger basis than last year and in a much wider scope.

Five students of the school of music held positions as organists and directors of church choirs during the current year. Twelve of them held recitals in places other than Howard University.

The glee club rendered eight recitals over the radio, made four trips to other cities, and gave the second recital at the White House.

SCHOOL OF MEDICINE

The school of medicine is the functional organization which represents the cooperative interests of the entire medical unit of the university without superseding the direct authority from the independent faculties to the board of trustees. The autonomous member units are the college of medicine, the college of dentistry, and the college of pharmacy. Freedman's Hospital, an independent institution built upon grounds owned by the university, is functionally a part of the university medical unit.

COLLEGE OF MEDICINE

Outstanding events of the year.—(1) Decided progress in the reorganization of the medical and surgical services in the Freedman's Hospital, and in the improvement of the teaching of medicine and surgery under supervision of full-time professors and heads of the departments, made possible by grants from the General Education Board and the Rockefeller Foundation. (2) The introduction of a post-graduate course in venereal disease control supported by a grant of \$7,500 made available from the Social Security funds by the United States Public Health Service. The course was given by the college of medicine in cooperation with the United States Public Health Service, the Health Department of the District of Columbia, and Freedmen's Hospital. The course was designed primarily to train select Negro physicians, particularly in the southern states. (3) The board of trustees approved the establishment of the E. A. Balloch student loan fund, to serve as a revolving loan fund providing small, short-time loans to medical students. (4) A grant of \$600 was given by the National Tuberculosis Association to be used by the head of

the University Health Service for the purpose of stimulating interest, nationally, in the health of Negro college students with special reference to tuberculosis. (5) The general surgical mortality of the Freedmen's Hospital during the past 2 years has been reduced from 6.5 percent to 0.03 percent. (6) Responsibility for the university health service was placed on the dean of the school of medicine. The work of the year was carried through with a high degree of efficiency. (7) The conducting of the tuberculosis case findings program among freshmen students made possible by a grant of \$400 by the Tuberculosis Association of the District of Columbia. (8) The addition of nine assistant residents to the house staff of Freedmen's Hospital.

Students.—Of a total of 212 applicants, 171 presented minimum premedical requirements for admission. Thirty-five freshmen were admitted. The greatest number of medical students registered at any time during the year was 139.

During the year the school of medicine furnished instruction to 298 students, distributed as follows: Medical students 133; students in dentistry 34; dental hygiene 7; pharmacy 29; nurses 42, and post-graduates in venereal disease control 25, making a total of 260.

Instruction was also given by the staff in mental hygiene and public health to graduate students in sociology and social work.

The degree of doctor of medicine was conferred upon 22 graduates at the June commencement all of whom have secured internship in hospitals approved by the Council on Medical Education and Hospitals of the American Medical Association.

Fifty-nine Howard medical graduates were examined by 13 State boards in the United States during the year. Fifty-four passed and five failed. The percentage of failures was 8.5%.

Faculty.—Of a total official faculty of 111, 26 were full-time teachers and 85 were part-time. There was a full-time equivalent of 37.12 persons on the faculty of the college.

One General Education Board fellow in surgery has reported to the College of Physicians and Surgeons of Columbia University for graduate study; one General Education Board fellow is completing the study of neuro-psychiatry at the University of Iowa. Three associate professors were advanced to the full professorial rank in the departments of pathology, bacteriology, and biochemistry. There have been 20 scientific publications by members of the faculty during the year.

COLLEGE OF DENTISTRY

General trends.—There was another increase in the enrollment in the college of dentistry during the year 1937-38, continuing the slow but steady increase apparent since 1934. The outlook for 1938-39 is very encouraging. The department of oral hygiene was accredited by the regents of the University of the State of New York and en-

couraging progress was made in the placement of graduates in this new field of work at the university.

Enrollment.—Forty-one students registered for the year 1937-38 as compared with 38 for the year 1936-37. The oral hygiene enrollment of 7 made a total enrollment of 48. At the last meeting of the committee on admissions, 21 new applicants were approved for admission in 1938-39. This is the best outlook for a freshman class that the dental college has had in several years.

The accreditation of oral hygiene.—Our department of oral hygiene was accredited by the regents of the State of New York and the accrediting registration was dated back to include the first year of operation by the department.

Seven students were enrolled during the year. The faculty has set a registration of 10 as the maximum number to be admitted for the time being.

Very satisfactory progress has been made in the placement of our graduates in oral hygiene. In 1937-38, one graduate was appointed in the District of Columbia public schools; another was appointed as hygienist in the Veterans Hospital of Tuskegee, Ala.; another was appointed in the Sea View Hospital in New York, and still another was appointed in the private office of one of our successful graduates of Columbus, Ohio.

Improved equipment.—Five new units and six dental chairs were installed in the college of dentistry, and provisions made for a new X-ray unit.

Improved clinical performance.—The clinical classes this year earned an average of \$359.32 per student as compared with \$154.56 per student in 1929-30. While it is impossible to measure student performance in terms of dollars and cents, the enriched experience gained from extensive achievement in the clinical specialties forms a helpful measuring rod for professional capacity.

Graduates.—At the commencement season, six graduates were awarded the degree of doctor of dental surgery and six received certificates in oral hygiene.

University health program.—In cooperation with the program of the university health service, the college of dentistry has extended its service by way of complete oral diagnosis of students in medicine and dentistry and of all freshmen throughout the university.

Faculty.—There were 13 members of the faculty during the year, 11 of whom were giving full-time work while 2 were giving part-time service equivalent to 1 full-time teacher. Two members of the faculty were on sabbatical leave, doing work toward the degree of master of science in dentistry. There were three advances in rank during the current year.

COLLEGE OF PHARMACY

General trends.—With the discontinuance of the college of pharmacy at Meharry Medical College, the Howard University College of Pharmacy stands entirely by itself in Negro pharmaceutical education.

Registration.—There were 29 students registered for all classes at the beginning of the year, 2 of whom were women. Twelve were freshmen or beginning students, seven sophomores, five juniors, and four seniors.

Graduates.—Three graduates in the college of pharmacy received the degree of bachelor of science in pharmacy. This was the third class to graduate from the bachelor of science or 4-year course in pharmacy, adopted in 1932.

Faculty.—The faculty for the year 1937-38 was the same as the faculty of 1936-37, with two full-time professors, two instructors, full-time, and one instructor part-time. One instructor was on leave of absence without pay for the second semester, to pursue his studies for the doctorate degree at the University of Minnesota.

Student health.—The college of pharmacy has cooperated during the year with the university student health service in filling prescriptions written for students and furnishing the various medical prescriptions required. One hundred twelve prescriptions were filled during the 5-month period from January to May. Almost without exception, exclusive official United States Pharmacopoeia and medical formulary preparations were prescribed.

SCHOOL OF LAW

General trends.—The procedural course which previously has been given only in the first year has been extended to cover both the first and second years, and administrative law, labor law, and civil rights have been added to the curriculum for the first time. There is a definite tendency to raise the standards for admission to the bar. Especially is this noticeable in the District of Columbia, where the Bar Association has recommended that 2 years of prelegal work be required as a condition of admission to the bar.

Enrollment.—The enrollment for this year was larger and better equipped scholastically than at any previous time in the history of the school. Seventy-six students were in attendance from twenty-six States and two foreign countries. The enrollment has doubled within the last 4 years. Forty-seven of our seventy-six students have the bachelor's degree, and one has the master's degree. Thirty-nine colleges were represented in the enrollment—25 of these colleges for the education of Negro youth.

Twenty-one, or 77.8 percent, of the 27 entrants in the first year class possessed 4 years or more of college training.

Graduates.—Sixteen graduates received the degree of bachelor of laws at commencement. This is three times the number awarded degrees in 1936. Of 15 graduates, 1 had his master's degree and 11 had the bachelor's degree before they entered the school. All except two had more than the minimum prelegal requirement of 60 hours of college work.

Faculty.—The staff for the last year was increased by one assistant professor. We now have five full-time and four part-time persons on the faculty, distributed as follows: Professors, 1; associate professors, 1; and assistant professors, 3; all full time. Part-time staff: 2 assistant professors, 1 professor, and 1 lecturer.

The library.—The number of volumes now in the library is 19,478; received on purchase 421; received as gifts, 36; added as bound periodicals, 49; different periodical titles received on purchase, 36; different periodical titles received as gifts, 24; total circulation of books 1937-38, 4,810; total circulation of books 1936-37, 3,647; increased circulation of books, 1,163. The library was under the supervision of one part-time librarian.

Official inspection.—The president of the American Association of Law Schools visited our school of law during the year and, after thorough inspection, recommended that the school secure one additional stenographer, one additional full-time teacher, and one full-time library worker.

SCHOOL OF RELIGION

Financial support.—The school of religion received no aid from Federal funds. Its work is maintained entirely by endowments and private gifts. Two legacies approximating \$2,000 each became available during the current year.

General trends.—For 5 years our school of religion has been on a graduate basis, allowing only college graduates to matriculate. Since 1932 there has been an increase of 500 percent in the number of graduate students. The question as to whether a school of religion entirely devoted to the education of students of graduate calibre could succeed, is answered in the affirmative.

Enrollment.—In the first semester of the year 1937-38, 29 students were enrolled in the school of religion. During the second semester there were 32 students enrolled. This represents an increase from 9 college graduates in 1933-34 to an average of 30 in 1937-38.

The school has been interdenominational from its beginning. The present student body is drawn from six denominations, including the Congregational, the Baptist, the Methodist Episcopal, the colored Methodist Episcopal, the African Methodist Episcopal, and the African Methodist Episcopal Zion denominations. The student body this year came from 21 colleges.

Graduates.—Nine students were graduated from the school of religion June 10, 1938. Six received the bachelor of divinity degree and three received the master's degree in religious education. All graduate work is consolidated under the graduate school. For this reason the master's degree in religious education is given by the graduate school and not by the school of religion.

Faculty.—There was one new full-time appointment to the faculty. The faculty consisted of nine members, including three full-time professors, one part-time professor, and five part-time instructors.

Dr. W. Y. Bell, professor of old testament interpretation and Hebrew, was elevated to the highest office of his church—the bishopric. His position will be difficult to fill.

Library.—The school of religion library now contains 2,396 volumes. This represents an increase of 296 volumes over last year. At least 5,000 volumes are necessary for the minimum adequate functioning of the school.

Outlook and needs.—The dean expects 18 new students to matriculate in the fall. This will place the enrollment at 47 persons, or 10 short of the maximum to be achieved within the next 3 or 4 years. The quality of work done for the B. D. degree is being rapidly improved. The university is giving careful consideration to the problem of finding suitable quarters for the school of religion and is making effort to secure supporters for an increased faculty, increased scholarship funds, and a substantial addition to the book collection.

THE LIBRARY

Approaching completion of new building.—The approaching completion of the new library building has greatly increased interest in the work of the library. Further progress has been made in organizing the staff for efficient service in the new home.

Library organization and administration.—The library is now organized in 6 departments with 12 assistants. An average of 28 students worked in the main library during the year on university and N. Y. A. scholarships.

Library departments' progress.—Acquisitions department reports 4,954 items accessioned, representing 2,514 items by purchase, 1,583 by gift, 477 by binding, 38 by exchange, and 342 acquired by school of medicine. Large gifts were received from the Ministry of French Foreign Affairs, the estate of Myra T. Spaulding, Mrs. Josiah T. Settle, and Teachers College Library, Columbia University.

The serials division added 113 new titles, bringing its current titles received to 570 with a periodical issue circulation of 1,410.

A total of 4,250 titles and 4,842 books were cataloged.

The circulation and reference division issued 2,652 identification cards, reported a circulation of 70,489 books for reserve and nonreserve books and bound periodicals.

The Moorland Foundation fulfilled 2,688 recorded book requests, added a total of 299 items and filed about 10,000 cards in its special catalogs, files, and indexes. The librarian gave lectures on library usage to all freshmen. The system of interlibrary loans was expanded, so that 445 items were requested for Howard, while 26 requests were received from other schools.

Special projects.—With W. P. A. assistance, the union catalog of material by, on, and relating to the Negro was begun, an official subject headings list for our card catalog made a reality, and nearly 8,000 unaccessioned items listed and arranged in acquisitions room.

Statistics (total).—The total number of books now accessioned in the university libraries is 111,801. The main library handles 570 of the 808 periodical titles received and is responsible for 74,587 of the entire circulation. Total circulation reported as 132,481 for 1937–38.

BUILDINGS AND GROUNDS

Buildings under construction.—The following table shows the list of building projects in process during the year ended June 30, 1938. These buildings were constructed under funds and direction of the Federal Emergency Administration of Public Works.

Building Projects in Process, Year Ending June 30, 1938

No.	Description of project	Date authorized	Total appropriations
5	Construction and equipment of a library building.....	Feb. 14, 1931	\$1, 105, 000. 00
8	Construction and equipment of a heat, light, and power plant.....	Feb. 17, 1933	555, 576. 99
9	Construction and equipment of dormitories for men.....	Oct. 4, 1935	525, 000. 00

The status of the above listed projects as of June 30, 1938, was as follows:

Project No. 5.—Construction and equipment of a library building. Exterior walls and roof completed; interior work nearing completion. Expected to be ready for occupancy during the first semester of 1938–39.

Project No. 8.—Construction and equipment of heat, light, and power plant. Tests completed and plant put in use throughout the school year 1937–38.

Project No. 9.—Construction and equipment of dormitories for men. Second group of bid proposals exceeded the appropriation. Contract let for central unit and two of four wings. Walls halfway completed. Application pending for funds to complete the project as originally planned.

FINANCES

Assets—The total assets of the university at June 30, 1938, were \$9,174,836.41, exclusive of the unexpended balances of Government appropriations for the chemistry building; the heat, light, and power plant; the library; and the men's dormitories. Of the total assets, the sum of \$1,201,425.70 represents assets in the physical plant exten-

sion fund, made possible through private gifts of the General Education Board and the Julius Rosenwald Fund, and from rentals of the property purchased by the gifts of these funds; \$1,031,401.46 represents endowment (an increase of \$71,807.92); \$6,807,837.87 represents plant fund assets (an increase of \$829,600.74 since the report of June 30, 1937) exclusive of the unexpended balances of Government appropriations for buildings, as indicated above. One thousand three hundred twenty-eight dollars and thirty cents represents a small loan fund for students in the school of medicine. The remaining \$232,842.32 represents assets of the current fund.

Income and expenditure.—The total income for the year 1937–38 was \$1,911,755.22, including current and capital funds. This represents a gross increase of \$484,313.91 over the total income for 1936–37. This increase is due primarily to an increase of \$474,382.25 in the income from previously appropriated Government funds for buildings. The total income for current purposes during 1937–38 was \$1,124,283, representing an increase of \$8,931.66 over the current income for 1936–37. Of the total income for current purposes the Government contributed \$699,824.76 or \$19,459.94 less than the Government contributed for 1936–37. The income for current purposes from private sources increased from \$396,066.64 in 1936–37 to \$424,458.24 in 1937–38.

Attention is respectfully directed to the fact that during the year 1937–38 the endowment of the university passed the million dollar mark, and that there was an increase of \$60,867.70 or 4.29 percent in the amount of money spent for resident instruction.

Balanced budget.—Again as during the school year 1936–37, the budget of Howard University was kept at balance, the income exceeding the expenditures by \$236.56. This sum was applied to the retirement of the accumulated deficit.

The audit of funds.—The auditing of all the university's accounts has been done by certified public accountants. All moneys appropriated by the Congress and by the Federal Emergency Administration of Public Works were expended under the supervision of the Secretary of the Interior. The accounts involving these funds have been inspected by the Government accounting officer and have been found to be satisfactory.

APPRECIATION

On behalf of the trustees, faculties, and students of Howard University, I wish to express to the Secretary of the Interior and through him to the Members of the Congress and to the President of the United States my appreciation for their thoughtful and constructive interest in Howard University, and to all the officers and employees of the Department of the Interior for their courtesy and helpfulness in handling the affairs of Howard University.

FREEDMEN'S HOSPITAL

Dr. T. Edward Jones, *Surgeon in Chief*

FREEDMEN'S HOSPITAL, in addition to affording an opportunity to the young Negro to perfect himself or herself in the field of medicine or in training for nurses, affords a competent center for the treatment of human ills. Hospital facilities in many communities being inadequate for the colored man, Freedmen's Hospital continues to receive approximately 50 percent of its patients from the States, distant as well as nearby.

For the first time, the professional staff of the hospital, in keeping with regulations governing other members of the American Hospital Association, was during the year graded according to rank resultant upon experience and ability. The installation of modern intercommunicating equipment, with a minimum expenditure, added to the efficiency of operation. The number of internes was reduced from 24 to 16, effective July 1, 1938. In their stead, eight assistant residents were appointed. These assistant residents have already served a 1-year internship. They are closely associated with the internes following them, and in addition to improving their own professional ability, act as a guide to their less experienced followers.

This system serves a twofold purpose. It gives added assurance of proper patient care and at the same time affords an opportunity for the young physician to spend from 1 to 3 years in hospital training.

Those who show superior qualifications are eligible for appointment as residents, the sequence being interne, assistant resident, and resident.

TRAINING SCHOOL FOR NURSES

At the beginning of our administration, we found ourselves faced with an edict from the Nurses' Examining Board of the District of Columbia of a cancelation of registration of our training school for nurses, effective September 1, 1938. Upon our appeal to the office of the Secretary of the Interior, Miss Virginia Livesay, R. N., was assigned to Freedmen's Hospital as technical adviser on nurse administration for a period of 6 months. In consequence of her survey, reorganization of the school, and institution of a modern program for nursing procedures, the Nurses Examining Board of the District of Columbia, in response to our request under date of August 1938, informed us that our registration would be continued until September

1, 1939, and assured us if we paralleled our progress as of today, our registration would be still further extended. This means that additional graduate nurses, hospital attendants, and equipment must be secured.

We cannot commend too highly the excellent work done by Mr. Richard Mackenzie, hospital consultant, and Miss Virginia Livesay, technical adviser on nurse administration.

N. Y. A. AND W. P. A. PROJECTS

The N. Y. A. project within the hospital has offered an excellent opportunity for the Negro youth to fit himself for helpful service in the advancement of health. They learn much with reference to proper housekeeping in regard to the sick, as well as the attention which must be given. The hospital, in return, derives some benefit from their services rendered.

One W. P. A. project installed July 1, 1938, is rendering valuable aid assorting, assembling, and filing our old records. Another W. P. A. project is giving material help in our efforts to keep the hospital at a high standard of cleanliness.

CONCLUSION

With a sympathetic understanding and cooperative attitude upon the part of the Secretary of the Interior and others, Freedmen's Hospital finds itself gradually emerging from its pauperism. It was necessary to request a deficiency appropriation of \$10,000 in order to keep the hospital doors open for the last 6 months of the fiscal year 1937, and a deficiency appropriation of \$15,000 for the fiscal year 1938.

Feeling that there might be an error in judgment upon the part of the Chief Surgeon as to the needs of the hospital, as well as a possibility of inexperience in hospital management, a request was made upon the Secretary of the Interior for a survey to be made by a hospital expert. The request was granted, and Mr. Richard Mackenzie made the survey. His findings justified our budget estimate and revealed that we were altogether too modest in our requests. As a result, a supplemental budget of \$196,500 was submitted for the fiscal year beginning July 1, 1938. Of this supplemental budget \$50,000 was appropriated by Congress, along with a \$15,000 deficiency appropriation for the fiscal year ending June 30, 1938. This increased appropriation will go a long way toward improving the efficiency of the hospital.

We still need 30 graduate nurses, 42 hospital attendants, 4 laboratory helpers, 1 pathology laboratory technician, 1 assistant pharmacist, 4 assistant social service workers, 1 assistant dietician, 8 junior clerk typists, 4 messengers, 6 guards, 3 elevator operators, 5 electrician helpers, 6 cooks, 4 kitchen helpers, 2 gardeners, and 4 laundry workers.

There also should be an increase in the maintenance appropriation to meet the increased daily census.

COLUMBIA INSTITUTION FOR THE DEAF

Percival Hall, President

DURING the fiscal year ended June 30, 1938, there were under instruction in the advanced department of the institution, known as Gallaudet College, 82 men and 52 women, a total of 134, representing 39 States and the District of Columbia. This is a decrease of seven as compared with the preceding year.

In the primary and grammar department, known as the Kendall School, there were under instruction 32 boys and 41 girls, a total of 73. This is a decrease of one as compared with the preceding year. Of the total in this department 70 were admitted as beneficiaries of the District of Columbia.

There were admitted to the institution 28 males and 23 females; discharged, 17 males and 15 females.

HEALTH

Excellent health has prevailed during the year, with no serious surgical cases and no cases of a dangerous contagious disease.

COURSES OF INSTRUCTION

Instruction in architectural drawing was resumed. A special course was given in statistics and their graphical representation. A course in principles of teaching, begun last year, was continued. The rest of the curriculum remained the same.

NEEDS OF THE INSTITUTION

Special needs of the institution at the present time are new buildings: First, a combined library-recitation building, for which over \$60,000 has been given to the institution by friends and alumni of the college department; second, addition to the present laboratory building; third, addition to the gymnasium for basketball; fourth, new units for the Kendall School, consisting of new dormitories, school building, and two new cottages for resident instructors.

RESEARCH WORK

A research problem in connection with the simplest and most understandable means of communication with deaf students has been in progress under the direction of Prof. Sam B. Craig, with the aid of

funds supplied by the National Research Council. During the year appropriations have been made for the coming year for a regular research worker, and a number of problems, such as the study of the language of deaf pupils compared with that of hearing pupils, employment of the deaf in the District of Columbia, and particular studies of sight and hearing of pupils of the institution, are contemplated.

SEVENTY-FIFTH ANNIVERSARY

Invitations were extended during the year for the alumni of the college department to celebrate the seventy-fifth anniversary by a special meeting in June at Kendall Green. The regular meeting of the Conference of Executives of American Schools for the Deaf has also agreed to meet in Washington in October 1939, in connection with this celebration of the seventy-fifth anniversary of the opening of the collegiate department.

SPECIAL GIFTS

Special gifts were received during the year from Thomas S. Marr for a scholarship, and from Mrs. Olaf Hanson for an annual prize in memory of Dr. Hanson.

RECEIPTS AND EXPENDITURES

The total United States appropriation for the fiscal year was \$145,000, of which \$141,745 was expended. Special current funds were received to the amount of \$47,289.71, with expenditures of \$43,924, leaving a balance of \$3,255 to be returned to the Treasury of the United States from the appropriation and a balance of \$3,365.71 in special funds to be carried into the new fiscal year.

PRESENTATION DAY

At the close of the school year, seven graduates of the normal department received the degree of master of arts in course, eight students of Gallaudet College received the degree of bachelor of arts in course, and five the degree of bachelor of science in course. The honorary degree of master of letters was conferred upon Howard Leslie Terry, of California, deaf author and former student of the college; and honorary master of pedagogy upon Winfield Scott Runde, of California, graduate of the college retiring from the teaching profession after many years of successful service.

INDEX

A		D	
	Page		Page
Additions to National Park System.....	vii	Deaf, Columbia Institution for the.....	417-418
Appropriations:			
Geological Survey.....	166-167		
Indians.....	263		
Mines, Bureau of.....	206		
National Park Service.....	41		
Vocational Education.....	339-343		
Arts and crafts, Indian.....	233-234		
Alaska, natives, health work.....	242-244		
Alaska, Railroad.....	274-275		
Alaska, Road Commission.....	275		
Alaska, Territory of.....	273-275		
Alaska, work of Geological Survey in... 127, 134-140			
All-American Canal.....	82		
B		E	
Baker Island.....	280	East Texas oil area.....	361-364
Blue Ridge Parkway project.....	22	Education:	
Board on Geographical Names.....	371	C. C. C. activities.....	320-324
Bonneville project.....	84	Conservation.....	353
Boulder Canyon project.....	ix, 56, 80	Office of.....	xiv, 294-356
Burlew, Ebert K., First Asst. Secretary.....	xvii	Federal activities in.....	299-305
		Forum demonstrations.....	308-310
		General Board of, report.....	355-356
		Legislative needs for.....	349-350
		Indian adult.....	246-247
		Information Service.....	315-317
		Land grant colleges and universities.....	317-318
		Library work.....	310-311
		President's Advisory Committee on.....	346-348
		Public school enrollment.....	295
		Publications, Office of.....	343-345
		Radio broadcasting.....	306-308
		University cooperation.....	311-312
		Vocational.....	324-343
		Vocational, appropriations for.....	339-343
		Electrification, Rural, Puerto Rico.....	288-289
		Elk Hills oil case.....	iii-v, 264
		Enderbury Island.....	280
		Equatorial and South Sea Islands.....	280
		Exhibits, Office of.....	368
		Expenditures:	
		Geological Survey.....	166-167
		Mines, Bureau of.....	207-208
C		F	
Cadastral Engineering Service.....	88	Federal Buildings.....	35, 46
Canton Island.....	280	Federal Radio Education Committee.....	313-314
Cases, Division of Investigation.....	358-359	Federal Range Code, Foundation of.....	110-111
Central Valley project.....	ix, 54	Federal Tender Board, No. 1.....	361
Changes in park system.....	27	Fire prevention, national parks.....	17
Charters, Indian.....	251-253	Foreign minerals, study of.....	198-199
Chesapeake & Ohio Canal.....	3, 15	Forests:	
Civilian Conservation Corps.....	33, 49, 74, 89	Conservation on Indian lands.....	217
Education activities in.....	320-324	Director of.....	xiii, 122-124
Division of Grazing activities.....	114-116	Fire statistics.....	42
Indian Division.....	220, 222, 227-229	Protection, national parks.....	17
Coal, research in.....	179-181	Puerto Rico.....	293
Colorado-Big Thompson project.....	ix, 56	Forum, educational demonstrations.....	308-310
Columbia Institution for the Deaf.....	417-418	Freedmen's Hospital.....	415-416
Concessionaires, national parks.....	23	Fuel, development of, research in.....	174
Connally Act.....	360		
Conservation:			
Branch of Geological Survey.....	157-168		
Department, change of name.....	xvii		
Education in.....	353		
On Indian lands.....	217, 227-229		
Of Indian forests.....	217		
Mineral, program for.....	174		
Unified forest policy for.....	122		
Water supply studies.....	145-156		
Wildlife protection program.....	117-118		
Cooperatives, Puerto Rico.....	287		
Coos Bay wagon road grant lands.....	90		
Credit fund, Indian.....	250-253		
Crop results, reclamation projects.....	66		
		G	
		Gallaudet College, Columbia Institution for	
		the Deaf.....	417-418
		General Education Board, report of.....	355-356
		General Land Office.....	87, 106

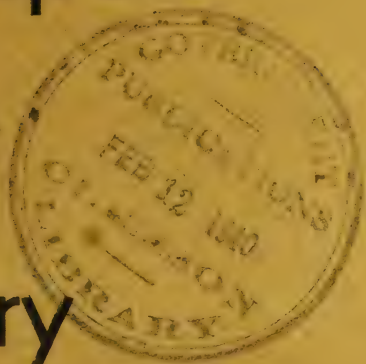
	Page		Page
Geographical Names, Board of.....	371	Indians—Continued.	
Geological Survey.....	x, 125-172	Reclamation projects.....	223
Geological Survey:		Roads.....	232-233
Conservation Branch, work of.....	157-163	Self-government.....	247-250
Work in Alaska.....	127	Social Security.....	237-238
Year's activities.....	126	Tribes.....	213-217, 220, 248-252
Grand Coulee Dam.....	III, IX, 54	Tuberculosis among.....	238
Grazing Act.....	87	Vocational education.....	245-246
Grazing Districts, Enforcement in.....	118-119	Information, Division of.....	366
Grazing Districts, Status of.....	110	Information Service, Education.....	315-317
Grazing, Division of.....	107-122	Investigations, Division of.....	356-359
C. C. C. work in.....	114-116	Irrigation and crop results.....	67
Organization of.....	110	Islands, Equatorial and South Sea.....	280
Grazing licences, number of.....	107		
Grazing program.....	XIII		
		J	
H		Jarvis Island.....	280
Hawaii, Territory of.....	275-277	Jeanes, Anna T. Educational Fund.....	356
Hawaiian Homes Commission.....	277		
Helium.....	x	K	
Helium, production of.....	188-189	Kendall School, Columbia Institution for the	
Historic American Buildings Survey.....	22	Deaf.....	417-418
Historic sites and buildings.....	15		
Homestead entries.....	97	L	
Health:		Land grant colleges and universities, Federal	
Alaska natives.....	242-244	activities in.....	317-318
Indian.....	238-242	Legislation, need for educational.....	349-350
Indian tuberculosis.....	238	Libraries in education.....	310-311
Puerto Rico.....	285-286		
Hospitals:		M	
Freedmens.....	415-416	Maps, work of Geological Survey on.....	140-145
Indian.....	241	Mine safety work, accomplishments in.....	173
St. Elizabeths.....	373-394	Mineral leases and mining claims.....	98
Housing:		Mineral withdrawals and classifications.....	103
Indian.....	230-232	Minerals, foreign, study of.....	198-199
Urban, Puerto Rico.....	292	Mines, Bureau of, report of.....	IX, 173-208
Howard University.....	395-416	Motion Pictures, Division of.....	367
Buildings and grounds.....	413	Muir, John.....	3
Finances.....	413-414	Museums.....	13
Graduates.....	399		
Students.....	397-399	N	
Teaching staff.....	400-402	Natchez Trace Parkway.....	22
Howland Island.....	280	National Capital parks.....	25
Hurricane Research, Puerto Rico.....	292	National Park Service.....	1
		Additions to system.....	VII
I		Blue Ridge Parkway project.....	22
Ickes, Harold L., Secretary, letter to Presi-		Changes in system.....	27
dent.....	III	Buildings space control.....	37
Indians.....	XI	Chesapeake & Ohio Canal.....	3, 15
Adult education.....	246-247	Concessionaires.....	23
Affairs, Office of.....	209	Federal buildings.....	35, 46
Appropriations.....	263	Fire protection.....	17
Arts and crafts.....	233-234	Forest protection.....	17
Credit fund.....	250-253	Historic American Buildings Survey.....	22
Education.....	244-247	Historic sites and buildings.....	15
Employment.....	257	Olympic National Park.....	2
Exhibits.....	234	Park attendance.....	1
Grazing, livestock and income.....	219	Proposed monuments and parks.....	31-32
Health.....	238-242	Regionalization of parks.....	5
Hospitals.....	241-242	Sugar pines.....	VI
Income.....	229-230	Travel Bureau.....	7, 8, 34
Land irrigation.....	221-224	Negro education.....	297
Land, mineral development on.....	161	Negro Affairs, Office of Adviser on.....	369-370
Population.....	257-261	Negro Schools, Jeanes Fund for.....	356

	Page		Page
O		Roads, Indian.....	232-233
Office of Exhibits.....	368	Rockefeller, John D., Jr.....	vi
Office of Adviser on Negro Affairs.....	369-370	Rum, Virgin Islands.....	279
Oil, shipments by water.....	364	S	
Olympic National Park.....	v, 2	St. Elizabeths Hospital.....	373-394
Oregon & California lands, forest policy in.....	122-123	Secondary investigations, reclamation.....	71
P		Self-government, Indian.....	247-250
Park attendance.....	1	Slattery, Harry, Undersecretary.....	xvii
Patient population, St. Elizabeths.....	374-375	Solicitor, Office of.....	264-269
Petroleum Conservation Division.....	360-365	States control.....	37
Pineapple industry, Hawaiian.....	276	Statistics, Geological Survey.....	166-172
Population, Indian.....	257-261	Sugar, Puerto Rico.....	286-287
Population, reclamation projects.....	63	Sugar, Hawaiian.....	276
Potteries, Puerto Rico.....	287	Sugar pines.....	vi
Proposed national monuments.....	32	Social Security, Indian.....	237-238
Proposed national parks.....	31	T	
Public lands, minerals, oil and gas on.....	159-161	Taylor Grazing Act, receipts from.....	91
Public lands, withdrawals of.....	94	Territories and Island Possessions, Division of.....	xvi, 273-280
Public schools, enrollment in.....	295	Travel Bureau.....	7, 8, 34
Publications, Office of Education.....	343-345	Tuberculosis among Indians.....	238
Puerto Rico.....	277-278	U	
Puerto Rico Reconstruction Administration.....	281	Universities, Federal educational cooperation.....	311-312
Puerto Rico rehabilitation.....	xvi	University, Howard (<i>see also</i> Howard University).....	395-416
R		V	
Radio, educational broadcasting.....	306-308	Virgin Islands Co., the.....	279-280
Raker Act.....	v	Virgin Islands, the.....	278-280
Reclamation, All-American Canal.....	82	Vocational education.....	324-343
Boulder Canyon project.....	ix, 56, 80	Vocational education, appropriations for.....	339-343
Bureau of.....	51	Vocational education, Indians.....	245-246
Central Valley project.....	ix, 54	W	
Construction program.....	53	War minerals relief cases.....	264
Colorado-Big Thompson project.....	ix, 56	Water power, Geological Survey, studies on.....	158-159
Crop results on projects.....	66	Water resources, studies of.....	145-156
Grand Coulee Dam.....	iii, 54	Wildlife conservation, Division of Grazing program.....	117-118
Indian projects.....	223	Wildlife management.....	13
Financial status.....	75	Y	
Population on projects.....	63	Yellowstone Lake.....	6
Secondary investigations.....	71	Yosemite, School of, Field Natural History... ..	12
Reclamation fund.....	58		
Reconstruction Administration, Puerto Rico.....	281		
Recreational demonstration area.....	33		
Regionalization, national parks.....	5		
Rehabilitation, Indian.....	230-232		
Rehabilitation, rural, Puerto Rico.....	282-284		
Repayment Commission.....	viii, 60		
Revested Oregon & California lands.....	90		
Rights of way.....	98		



1.1:1939

Annual Report of the Secretary of the Interior



FOR THE FISCAL YEAR ENDING JUNE 30

1939

**ANNUAL REPORT
OF THE
SECRETARY
OF THE INTERIOR**



FOR THE FISCAL YEAR ENDING JUNE 30

1939

**UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON • 1939**

UNITED STATES DEPARTMENT OF THE INTERIOR

Harold L. Ickes, Secretary

•

For sale by the

Superintendent of Documents, Washington, D. C.

Price 75 cents (paper cover)

CONTENTS

REPORT BY BUREAUS AND DIVISIONS

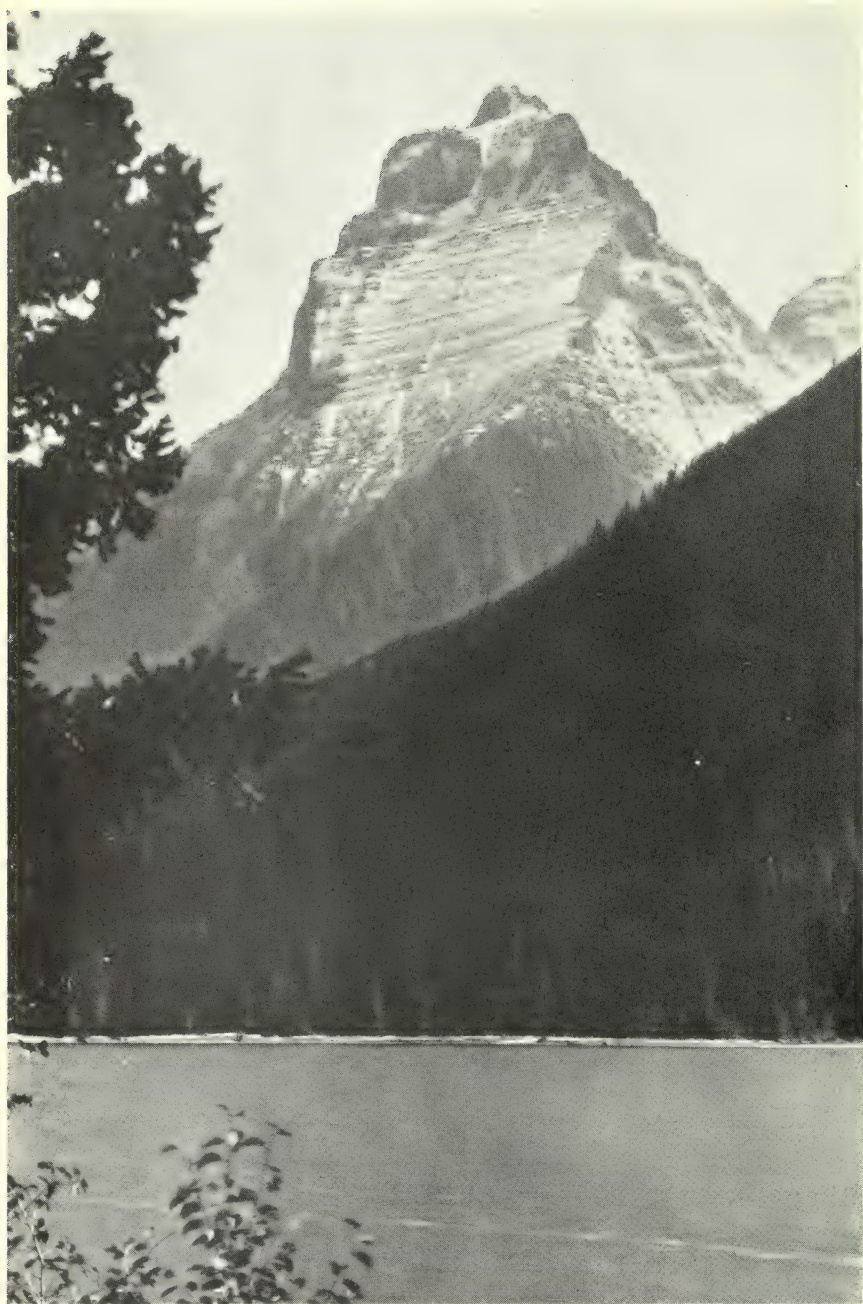
Page

Letter of Transmittal	v
General Land Office	1
Office of Indian Affairs	23
Office of Education	69
Geological Survey	139
Board on Geographical Names	191
Bureau of Reclamation	194
Bureau of Mines	232
National Park Service	264
Office of the Solicitor	313
Division of Investigations	322
Division of Grazing	326
Division of Territories and Island Possessions	344
Puerto Rico Reconstruction Administration	353
Petroleum Conservation Division	370
Office of Exhibits	374
Civilian Conservation Corps	375
Advisor on Negro Affairs	381
Bonneville Project	383
Division of Information	388
Interior Department Museum	390
Director of Forests	392
St. Elizabeths Hospital	396
Columbia Institute for the Deaf	422
Freedman's Hospital	423
Howard University	430

ILLUSTRATIONS

Frontispiece, Glacier National Park, Washington . facing page	v
Hazardous surveying for General Land Office engineers facing page	1
New school day dawns for Seminole Indian chil- dren. facing page	33
First test operation of All American Canal . . . facing page	194

Acres of lettuce get water from Southwestern irrigation project	facing page	Page 194
Oil for America, major problem of Bureau of Mines	facing page	232
Nature's monuments in Sequoia National Park	facing page	264
Storm on the range in New Mexico	facing page	326
Water for sheep through conservation	facing page	326
Cabbage field at Matanuska Colony, Alaska	facing page	344
Harbor at St. Thomas, tourist center in the Virgin Islands	facing page	344
Eleanor Roosevelt School, built by the Puerto Rico Reconstruction Administration	facing page	353
New farming methods under P. R. R. A. conservation program	facing page	353
Air view of power and navigation project at Bonneville, Wash.	facing page	383
St. Elizabeth Hospital, in Washington, as seen from the air	facing page	396
Partial view of Howard University campus	facing page	430



CONSERVATION PRESERVES GRANDEUR.

View of Kimberly Peak from Kinla Lake in Glacier National Park.

LETTER OF TRANSMITTAL

THE SECRETARY OF THE INTERIOR

WASHINGTON

MY DEAR MR. PRESIDENT:

There can be no question about the advances we have made upon the conservation front. While other nations have to struggle to obtain necessary supplies, our problem is how best to utilize and at the same time to safeguard the rich resources with which we are blessed.

At this moment the greatest actual or potential danger with which we are faced are heedless attempts to break through our conservation laws and policies for the purpose of making quick war profits. Evidence of an inclination to raid our resources, to be sure, exists more in the form of mutterings than in specific movements. But if experience is any guide, we can expect open efforts more or less thinly disguised as patriotic enterprises. As you know, the misuse of our resources in the World War was devastating. We have not yet fully recovered from the damage wrought at that time. Today logs can still be seen lying in the Olympic National Park that were cut in a frenzy of anticipated use more than 20 years ago. They never were used, but a profit was extracted notwithstanding. Only lately have the years, at long last, obliterated the scars of reckless wartime grazing on national-park ranges which never were capable of supporting the great numbers of livestock that were turned loose upon them. Other examples could be cited at length, all adding up to the fact that another "break-through" of the conservation front would cause perhaps irreparable damage.

This review of the accompanying detailed annual report of the bureaus and agencies of the Department of the Interior reveals clearly that the last fiscal year has produced tangible results in the field of conservation.

The accounts of the various bureaus of the Department have a single theme—their achievements in striving for a wise use of our natural resources. Owing to the work that we have accomplished during the last 6 years, our country is in a much stronger position to withstand crises, particularly those of an international nature. In the matter of timber, a system of sustained-yield production has been established within the forests of the public lands, particularly the great timber reservoir of the Oregon and California revested land grants. Our people have become vastly more aware of the necessity for intelligent use of our petroleum reserves. The public ranges of the West are making an excellent comeback through the administration of the Taylor Grazing Act. Effective protection measures have been undertaken upon the vast areas of Indian lands.

Strenuous efforts have been made to strengthen the economies of our territorial and island possessions.

Among the outstanding accomplishments recorded during the fiscal year was the discovery and development of the supply of potash on the public lands. Because of this, our dependence upon foreign supplies of potash was materially lessened and the cost of fertilizer reduced. Never before has the Bureau of Reclamation stored up such a vast amount of water for the arid sections. Within 120 days of its completion, the Bureau's Bartlett Dam offset a serious water shortage in Arizona. Transmission lines of the Bonneville project, already under construction, as well as the lines for which plans were completed during the year, will make Columbia River power available to many of the population centers of Oregon and Washington, as well as to large rural areas.

Particularly notable was the work of the Bureau of Reclamation, which was faced with a growing and pressing demand for more irrigation in the West.

BUREAU OF RECLAMATION

Despite the steady and swift progress being made by the Bureau of Reclamation in the largest construction program of its 37 years of existence, the demand for the Bureau's self-liquidating irrigation projects outran the capacity to supply them. Even though water storage was at an all-time peak, the supply was inadequate to meet the demand.

In water storage, a fivefold increase within 6 years was recorded during the year. No sooner were storage and diversion dams completed than they were called upon for service. New lands opened for farm settlement on the Owyhee project in Oregon and Idaho were quickly taken up during the year. On the last area opened for homestead entry, four times as many applications were received as there were farm units available. Inquiries from other farm seekers are still coming in.

The record with respect to the hydroelectric power produced as an important byproduct of reclamation, was equally impressive. Installation of the seventh great generator at Boulder Dam made this power plant the largest in operation in the world, with a capacity of 860,000 horsepower.

The gross income earned by Boulder Dam during the year totaled \$4,321,000. On June 1, 1939, the city of Los Angeles began paying at its contract rate for energy it received from Boulder. For power used during that month, the last of the fiscal year, the city alone paid \$157,105.

A milestone in the steady progress of the Bureau was passed with the enactment of the Reclamation Project Act of 1939. This law, perhaps the most important in the field since the original Reclamation Act of June 17, 1902, will make it possible to adjust many difficulties of the water users, to draft new contracts gearing repayments to the ability of the farmers to pay, to reclassify lands from time to time, and to accomplish other needed reforms. The Congress also heeded the Bureau's pleas for a more comprehensive investigation program,

and appropriated \$900,000 for studies of water resources and proposed developments.

Activities of the Bureau broadened on all fronts. At the end of the year, preparations were under way, with the cooperation of the Farm Security Administration, to assist in placing needy but qualified home seekers on Federal Reclamation Projects. An opportunity for former residents of the Dust Bowl to settle on reclamation developments was offered, and a number of such families was given a new start. In Arizona, the Bureau was able to extend badly needed help in an emergency when its Parker Dam power was made available during a critical power shortage caused by drought. In the Northwest, the Bureau joined with the Bureau of Fisheries to institute a major program for the control of migratory fish at Grand Coulee Dam, by establishing new spawning grounds, thus making possible the preservation of the fish.

Construction on Bureau projects forged ahead. At the close of the year, work was in progress on 30 projects in 12 States. Work was completed on eight dams. At Grand Coulee Dam, the second major contract was 38 percent completed at the end of the year.

Construction work was started on the Shasta Dam and power plant on the Sacramento River, about 9 miles north of Redding, Calif. This newest of the larger dams will be 3,500 feet in over-all length and will have an ultimate installed capacity of 375,000 kilovolt-amperes. The project will alleviate critical water shortage in three important agricultural areas in the State. In size and importance, the Central Valley enterprise is without precedent among the remedial projects undertaken by the Bureau.

Progress was made on the All-American Canal system, the largest irrigation ditch in the Western Hemisphere. The 80-mile canal from the Imperial Dam to the West Main Canal in the Imperial Valley was practically completed at the end of the fiscal year, except for certain structural work. The first 43-mile section of the Coachella Canal, a branch of the All-American Canal to the Coachella Valley, was 55 percent finished.

In Colorado, work was put under way on the Colorado-Big Thompson project, which will provide a supplemental water supply for 615,000 acres of land now under cultivation east of the Rocky Mountains. Other important dams under construction included Marshall Ford in Texas, Vallecito in Colorado, Grassy Lake in Idaho, Boca in Nevada and California, Seminoe in Wyoming, Fresno in Montana, Deer Creek in Utah, and Roza in Washington. Several of these were nearing completion with the installation of power-plant machinery and equipment in progress.

The year's work brought the accomplishments of the Bureau to an impressive total. In its 37 years of existence, the Bureau has completed construction on 156 storage and diversion dams, 48 powerhouses, 2,812 buildings, 20,101.4 miles of canals, ditches, and drains, 81.8 miles of tunnels, 4,661.6 miles of telephone lines, 285.4 miles of dikes, 6,337 flumes, 20,597 culverts, 13,738 bridges, and 198,521 other irrigation structures. Reservoirs of the Bureau now have a combined capacity of 47,121,170 acre-feet of water. This complete

"plant" last year made possible the production of agricultural crops valued at \$113,463,000.

The Reclamation Fund is decreasing. By the close of the 1941 fiscal year it will be so depleted that the Bureau will be unable to carry on the construction of its projects. Either the Reclamation Fund should be increased by an advance from the general fund of the Treasury, or certain of the more costly projects now being constructed should be financed by appropriations from the general funds of the Treasury, or in other ways.

NATIONAL PARK SERVICE

Additional areas, significant for their historic or scenic value, were brought into the Federal park system during the year. Five national monuments and three national historic sites were established, increasing the system to a total of 154 units. As the result of these additions, and boundary adjustments, the areas administered by the Service were increased by 1,623,295 acres, to a total of 20,817,228 acres. More than 16,250,000 persons visited the parks during the travel year ending September 30, 1938.

Many effective conservation steps were taken by the Service during the year. Intensive training of and additions to fire-prevention personnel, augmented equipment, as well as favorable weather conditions, resulted in a 10-year low record of fires in the Federal park area. Active support for the proposed Kings Canyon National Park in California came from all directions. Legislation to establish the park was passed by the House during the first session of the Seventy-sixth Congress and was reported favorably by the Senate Committee on Public Lands and Surveys. Meanwhile, pending the establishment of the park, negotiations were begun for the acquisition of various additional tracts to be made part of the park area.

The long fight to acquire the Carl Inn tract of giant sugar pines for addition to Yosemite National Park culminated successfully. In the field of historic conservation, the year was notable for the acquisition of the Subtreasury building on the site of the old Federal Hall in New York City. Fort Laramie National Monument, Wyo., was another noteworthy historic acquisition. As an outpost of military protection during the pioneer period in the West, Fort Laramie was important in frontier history.

In the continued effort to make improved service available to the travelling public, many steps were taken, including new accommodations in several parks and monuments. The historic American Buildings Survey was continued and the long-planned catalogue of drawings and photographs included in the permanent graphic records, was compiled and published during the year. Public Works Administration funds made possible construction of many long-needed building projects, among them the restoration and development of the Chesapeake and Ohio Canal. Construction work on the Blue Ridge and Natchez Parkways continued.

During the year the Service noted a steadily increasing demand for information circulars and printed pamphlets containing general

information about park areas and services. In spite of an increased allowance for printing, the shortage of informative literature was acute.

Extensive work was accomplished under the park C. C. C. program. The fiscal year closed with 311 C. C. C. Camps operating under the supervision of the Service, compared with 294 the year before. This work followed a general program of conservation and recreation development. This included construction of minor roads, trails, dams, cabins, and other park structures, as well as water and sanitary systems.

At the close of the fiscal year the activities of the Service's branch of buildings management were transferred to the Federal Works Agency in accordance with Reorganization Plan No. 1. Between the time that the functions of building management were first placed under the Department of the Interior in 1933 and the transfer, the branch had grown in size and had greatly extended its scope. In 1933 the unit operated 45 buildings and 5 memorials in Washington, D. C. At the time of the transfer it was the largest organization of its kind in any one city, operating 128 buildings and 7 memorials and monuments in the National Capital.

Two major problems face the Service in the years immediately to come. One is to round out the Federal park system by the inclusion of those areas whose highest value is that of conservation or recreation. The other problem is that of personnel. There is a basic need for trained, permanent employees to operate the system. The resources placed under the protection of the National Park Service are bound to suffer if an adequate protective and administrative force is not provided. Replacement of the remaining temporary personnel by permanent Civil Service employees offers the only completely satisfactory solution.

PETROLEUM CONSERVATION DIVISION

The Petroleum Conservation Division continued its vigorous administration of the Connally "Hot Oil" Act. Federal Tender Board No. 1, operating in the east Texas area, reviewed close to 5,000 applications for tenders during the year. The Division reported that a total of 903 new wells was completed during the fiscal year in the east Texas area, where 25,858 producing oil wells were already in existence.

Eight refineries were operating on Federal tenders in the east Texas field at the beginning of the fiscal year. Sixteen natural gasoline plants connected to 24,168 wells on June 30, 1939, reported operations to Federal Tender Board No. 1.

Several investigations were carried forward during the year outside of the east Texas area. One examination surveyed the oil proration procedure in Arkansas, Kansas, Louisiana, New Mexico, Oklahoma, and Texas to determine how such procedure affects administration of the Connally Act. Operating conditions in several areas were scrutinized. Staff members of the Division testified before legislative committees in California and Illinois in connec-

tion with proposed petroleum conservation legislation. It is to be hoped that cooperative relationships can be established with those States and others to further the conservation and protection of our great natural resource of petroleum.

DIVISION OF GRAZING

The fifth year of administration of Federal range grazing districts found the conservation activities of the Division of Grazing far advanced. While the first work of the division, following its establishment in 1934, was devoted to organization, the last year witnessed definite accomplishments along progressive conservation lines. The collection of data on periods of grazing use, movements of stock from range to range, and the qualifications of present and prospective uses, was improved. Agreements and cooperative arrangements with States and Federal agencies were continued. A detailed system for more efficient management of Federal lands was put into effect.

A 2-year study of the essential functions of the Division resulted in a new organization set-up.

During the year, grazing licenses and permits were issued to 19,342 stockmen, owning 11,032,642 head of livestock in 50 grazing districts. In addition, under the cooperative Grazing Association plan in Montana, 28 grazing associations managed approximately 240,000 head of livestock on lands of all ownerships.

An increase from 45 to 90 C. C. C. camps assigned to the Division enabled more extensive improvement work on the range than theretofore was possible. Major activities of the C. C. C. units included development of water supplies, fence construction, building of stock trails and corrals, rodent control, truck trails, bridges, check dams, and the like. The opening of truck and stock trails will greatly facilitate the movement of animals from winter to summer range, or to market.

Effective coordination of conservation activities on the ranges was brought about by the appointment on each advisory board of a wildlife representative. This will enable a clearer understanding between the stockmen and the State and national wildlife agencies in the matter of use and preservation of the natural resources on the range. In addition to making possible vigorous enforcement of game laws within the grazing districts, it will also make easier the control of predatory animals and the redistribution of big game in the so-called critical big-game areas, where starvation has been the natural accompaniment of excessive concentration.

It is a pleasure to report that the Division collected a greater amount in fees than its regular appropriation. Fee collections totaled \$833,385, while the appropriation was \$650,000.

It may be noted that Federal range regulation generally, including the assessment of nominal fees for use of the range, has met with support from virtually all of the 20,000 licensees engaged in the livestock industry. Only a small isolated group of 40 individuals in one of the 53 Federal grazing districts has disputed the Secretary's authority to collect fees for the issuance of temporary licenses.

Notwithstanding the fact that they had received the benefit of range improvements made possible through the collection of fees from other licensees, these persons obtained an injunction from the State court, restraining the regional grazier from interfering with their free use of the range. Appeal from this injunction was taken to the Nevada Supreme Court by the regional grazier. As a further means of securing fair play for the 20,000 other licensees who have cooperated with the Division, the Attorney General, pursuant to my recommendation, directed the United States Attorney to institute suits in the Federal Court for the collection of all delinquent fees from this group, which constituted only a small percentage of all of the users of the range in this particular grazing district.

OFFICE OF INDIAN AFFAIRS

To the Office of Indian Affairs, the year brought the maturing of its program, a great quantitative increase in Indian participation in their own affairs and the consolidation of efforts to assure the future of the Indians. Many of the most important results were, of course, in the field of intangibles.

Indian lands have ceased to dwindle; they are, in fact, slowly increasing. Indian natural resources have ceased to disappear through wasteful over-use; instead, they are coming back. Indians have ceased to be inactive while white men do their work; rather, more than half of the regular employees are Indians. The Indian death rate is no longer menacing the survival of the race; in fact, the yearly increase of Indians is more than that of other groups. Indians are no more the solitary element in the population of the country existing in a totally unorganized status; instead, political and industrial self-government is being achieved by an overwhelming preponderance of the tribes.

The process of assuring self-government to the Indians continued to make progress, although at a somewhat slower pace. A total of 12 tribes adopted constitutions and bylaws and 8 became incorporated. Added to the tribes which previously had adopted constitutions, this gave a total of 93 tribes under constitution and bylaws and 64 under charters of incorporation.

A large number of physical improvements were brought about by the Indian Service during the year. With the aid of Public Works Administration funds, 37 school buildings were erected and 5 hospitals remodeled. A total of 43 cottages was built and 7 infirmaries and dispensaries added. The total of new structures was 267.

The various technical Government agencies continued to supply specialized service to the Indians. These included the Social Security Board, the Soil Conservation Service, the Civilian Conservation Corps, the Federal Security Agency, the Works Progress Administration, the National Youth Administration, the Public Works Administration, the Public Health Service, the Smithsonian Institution, and the Bureau of American Ethnology. Liaison was continued between the Indian Service and the Forestry Service, the Bureau of Animal Industry, the Bureau of Public Roads, the Office of Education, the Division of Cultural Relations in the State Department, the

Bureau of Reclamation, the General Land Office, the Division of Grazing, and other units. The activities of these agencies were coordinated with the program of the Indian Service for the general welfare of Indians. A great human saga was written in the Indian country and in Indian life as the result of these efforts. Notable progress was made in the fields of agriculture, conservation and social and economic welfare.

Rehabilitation in its broadest sense made a steady advance during the year. A just appraisal of the results in the field indicates substantial and heartening progress by the various divisions whose activities have been characterized by a steadily increasing cooperation between government representatives and the Indian people. Of special importance was the work of the extension personnel, who perhaps more than other Service representatives, are in constant touch with the Indians. Credit was supplied for various types of agricultural and industrial enterprises. Additional lands, sorely needed, were purchased by many groups. Irrigation projects enabled desert areas to be put into useful production. Agricultural education was emphasized in the Indian schools and rehabilitation grants were made for housing, farm buildings and self-help enterprises. Excellent progress was reported in the improvement of Indian health as a result of the work of the Indian medical service.

The Indian Service pushed forward through the year its efforts to explain and interpret the new policies which have been set in motion. The very essence of a new day for Indians is a complete understanding of Indian and non-Indian problems as a basis for intelligent self-government.

On probably no subject in the history of the United States has there persisted a more dramatic and yet a more flagrant atmosphere of error than with respect to matters concerning the American Indian and his affairs. From the heroic distortions of the James Fenimore Cooper school of fiction to the fantastic sensationalism of some modern movies; from the early exploitation by land-hungry Europeans to present day petty racketeering, the history of white-Indian relations has been a history of inaccuracy or ignorance, relieved only occasionally by rare and refreshing currents of factual illumination.

One of the important aims of present-day Indian administration has been to intensify, to amplify, and to spread the hitherto feeble light of fact. Encouragingly, the public is beginning to learn that fact can be as interesting as fiction; that the unadorned truth about Indians and their affairs is more absorbing than misconception.

The Indian is no longer a vanishing race. It is neither dying out nor is it rapidly merging into the white society. Indians as Indians will apparently continue as a part of American life for a good many years. The Indian population is still more than holding its own in numbers, both in the country as a whole and on most of the reservations. The rate of increase is becoming accelerated. Should the rate for the past quarter century continue for another 25 years, Indians in the United States will number well over 400,000. While this is proportionately a very insignificant figure, it nevertheless presages a very serious pressure of Indian population upon existing reservation lands. Already this pressure is being felt in the Navajo jurisdiction

and in others where prospects of acquiring additional lands are not too hopeful.

The future of the Indian culture is brighter today than at any time since the advent of the white man. Not only will it continue to give deep satisfaction to the Indians themselves, but, in its interaction with white culture, it will make fundamental contributions to general American civilization.

THE BONNEVILLE ADMINISTRATION

Through steady progress of the work undertaken at Bonneville, the opening of this region to sound and progressive development was brought closer during the year. The harnessing of the vast power potentialities of the Columbia River will bring about far more significant benefits than the mere increase in the use of electricity in the home. Abundant power at low rates will open the way to a sound use of the great resources of this region which at present lie untapped. Additional activities in the Columbia River Basin, in accordance with the principles of progressive conservation, can provide new opportunities for thousands of marginal farmers and artisans who are looking for a chance to earn a livelihood in the traditional American way.

Essential to the opening of this region is the construction of necessary power lines. Fortunately, the year saw the beginning of construction of the transmission network which will make Bonneville power a tractable, available force. The lines under construction at the close of the fiscal year, together with extensions for which plans were completed, will make Columbia River power available to most of the population centers of Oregon and Washington.

The construction of the "backbone" line from the dam to the major substation at Vancouver was 65 percent completed at the close of the year. From this line, power will be dispatched to communities in western Oregon and Washington. The other major line, on which construction was started, is designed to serve Portland, Oregon City, Salem, Eugene, and the Willamette Valley.

Plans and specifications were completed for the circuit to connect Bonneville with Grand Coulee Dam. The linking of these two projects will permit an interchange of approximately 100,000 kilowatts of energy over a single circuit.

Construction of the initial distribution network of the Bonneville system is being hastened to meet requests for power which have been received from public power districts, municipalities, irrigation systems, rural cooperative associations, and private utility companies. Delivery of energy is awaiting the completion of necessary construction schedules, as the present lines in the area are either heavily loaded or inadequate to carry required quantities of power from the dam site. At the direction of the Congress public and cooperative purchasers will be accorded preference in the sale of energy.

The death of J. D. Ross, first Administrator of the project, on March 14, 1939, created a major problem in the selection of a successor. Pending an appointment of a permanent Administrator, Frank A. Banks, Construction Engineer of the Bureau of Reclamation, in charge of the erection of Grand Coulee Dam, was made Acting Administrator.

DIRECTOR OF FORESTS

The Office of the Director of Forests reported progress with a number of fundamental conservation problems during the fiscal year. These included the organization of the Oregon and California Revested and Reconveyed Grant Lands Administration; the surveying of forest resources; the preparation of a report covering the administrative organization of forestry within the Department; the direction and control of departmental forestry business; the administrative direction of Indian forest and range lands, and the rendering of technical advisory service to the Department on forestry matters.

Including the land in the Territory of Alaska, the Department of the Interior is responsible for the management of 600,000,000 acres of public lands. This represents approximately three-fourths of all the land now in Federal ownership and embraces a wide range of timber resources, including the productive forests of the O. and C. lands, the timber stands on Indian reservations, and the forests and wood-lands of the unappropriated and unreserved public domain.

During the year, major steps were taken to establish a plan of sustained-yield forest management on the O. and C. lands under the Act of August 28, 1937. Regulations providing for the sale of the timber under good forestry principles were placed in effect, and classification of the lands was started. The entire business setup of the administration was brought under direct control, and a substantial volume of timber was advertised and sold.

Although the funds made available for the protection of the interior forests of Alaska were inadequate to perform a complete job, a foundation was laid for future effective protection and administration. Considerable progress was made possible by cooperation with the C. C. C. and other Federal and private organizations in Alaska.

DIVISION OF TERRITORIES AND ISLAND POSSESSIONS

At the end of the fiscal year the Division of Territories and Island Possessions, under the Reorganization Act, was making plans for taking over the Bureau of Insular Affairs from the War Department. The Division was also busy with the advance arrangements for the United States Antarctic Service, which is sending an expedition to the Antarctic regions under Admiral Byrd.

In the realm of its Pacific interests, a contract was executed between the Department and the Pan American Airways, whereby areas on Canton Island were leased to the Airways company in connection with its commercial trans-Pacific service.

ALASKA

During the year continuous transportation service was rendered by the Alaska Railroad between Seward and Fairbanks. Although the railroad was operating at a deficit, the revenues for both freight and passenger service showed a considerable increase. Rail line passengers numbered 27,436 with revenues of \$259,452. Freight amounted to 157,904 tons.

A new hotel, constructed with P. W. A. funds, was put in operation at the entrance to Mount McKinley National Park.

THE VIRGIN ISLANDS

The sugar business, basic industry of the island of St. Croix, suffered another serious set-back as the result of a drought which followed a severe water shortage in previous years. Both the sugar and cattle business suffered heavy losses. St. Thomas, on the other hand, continued to show improvement because of substantial increases in the shipping business and tourist trade. Efforts made to secure a measure of relief for the sugar farmers through the repeal of the \$6 per ton sugar export tax and the granting of benefit payments to sugar growers failed.

Approximately 750 persons in St. Thomas were engaged in the production of goods sold through the Virgin Island Cooperatives. Sales of the three units totaled \$60,752 during the year.

THE VIRGIN ISLANDS CO.

Extensive activities were reported by the Virgin Islands Co. Its operations included the production of sugarcane and the manufacture of raw sugar; the manufacture and sale of rum, distillates and alcohol; the management of a poultry farm, and the operation of a rock-crushing establishment. It also rented tractors and farm equipment to the farmers of St. Croix, performed general repair work and sold cattle and milk products. In its activities the company has employed directly a thousand persons and brought extensive improvements in pay, housing, sanitation, and general social conditions to the workers of the islands.

PUERTO RICO

The finances of the insular government made a very satisfactory showing during the year. The tourist business showed an increase.

The year was marked by tangible military recognition of the strategic importance of Puerto Rico in the defense of the Panama Canal, the South Atlantic and Gulf States, and trade routes of the Carribean. The island was made a separate military department and the establishment of naval and military air bases and a submarine base was authorized. The dredging of San Juan harbor was virtually completed. This will provide a safe and convenient anchorage for heavy warcraft. A large graving dock of the most modern type, which will be at the disposition of the Navy as well as of commercial vessels, also was under construction at San Juan.

PUERTO RICO RECONSTRUCTION ADMINISTRATION

Encouraging progress was made by the Puerto Rico Reconstruction Administration during the year, and a number of programs were put under way in cooperation with other agencies of the Federal Government. The United States Forestry Service and the Insular Forestry Service joined with the P. R. R. A. Forestry Division in pushing forward a general forestry program. The P. R. R. A. Rural Electrification program was coordinated with the efforts of the insular government to develop the island's natural resources.

The Bureau of Animal Husbandry and the insular government cooperated in the P. R. R. A. cattle tick eradication program. Roads, waterworks, public buildings, and other works were projected by the P. R. R. A. after deliberation with insular and municipal officials.

As an outgrowth of a series of conferences sponsored by the P. R. R. A. and attended by representatives of various insular and Government agencies a program of coordinated activities in connection with agricultural development was worked out, which shows promise of excellent results. It calls for the expansion of 4-H Club work, soil conservation, commercial crops, livestock and poultry farming. It provides for better farm management and home activities. Among its objectives is the improvement of animal husbandry. It also provides for the establishment of small plots upon which subsistence crops can be grown by needy and idle persons. A large number of far-reaching experiments to bolster the agriculture of the island were undertaken.

Extensive activities were reported by the various cooperatives which are operating under the P. R. R. A. program. The Lafayette sugar cooperative, during its crop season, produced a total of 225,843 bags. The organization of the Los Canos sugar cooperative was completed during the year and improvements started. Other cooperative groups are successfully reviving old industries as well as stimulating new ones. The growing of cotton in Puerto Rico came to a halt some time ago, but, with the reestablishment of mill and marketing facilities, the island is growing more cotton than ever before. Although the marketing of Puerto Rican wild oranges in the United States was stopped by an embargo because of the fruit fly, during the fiscal year a cooperative began to market these oranges in the form of canned juice.

In an effort to achieve a more stable economy for Puerto Rican farmers, efforts are being developed to find new uses for their products. The Lafayette sugar cooperative is attempting to increase the growing of sugar cane for the extraction of byproducts, such as butyl alcohol. For the manufacturing of this product, a \$500,000 plant has been built at Lafayette in which alcohol will be extracted from sugarcane residue by a fermentation process developed in Puerto Rico. As the marketing of solvents increases, it is planned to step up the production of the plant. A number of solvents, which may be obtained from sugarcane residue, namely acetone and glycerine, are valuable war materials.

In the field of rural rehabilitation the P. R. R. A. achieved worthwhile accomplishments during the fiscal year. Land utilization was carried forward and the working knowledge of resettlement farmers improved in the direction of more modern agricultural practices. Good seed was provided, as well as swine and poultry. In 8 large rural resettlement projects 2,598 houses were built and a total of 541 were under construction at the end of the year.

In the general forestry program for Puerto Rico one of the most promising rehabilitation activities was the establishment of forest homesteads. The system is aimed at making each forest unit self-supporting and at providing permanent homes and living for several

thousand families. The settled forest homesteads at the end of the year took care of 700 farmers on 2,148 acres of forest land.

However, it is apparent that Puerto Rico faces a long and difficult pull. There is evidence on every hand of a splendid beginning in reconstruction and rehabilitation. There are more signs of success and happiness and fewer signs of destitution. It must be remembered that centuries went into the making of the conditions which the P. R. R. A. is attempting to rectify. When the situation is examined realistically it is apparent that it will take many more years to put the island back on its feet economically. The immediate need is serious. Thousands have been deprived of employment through the establishment of quotas in the sugar industry. The application of the Fair Labor Standards Act to Puerto Rico disrupted its industries, notably needlework. The reexamination of this legislation, as it affects the economy of Puerto Rico, might go a long way toward aiding the island in the solution of its own economic problems.

Fundamentally, the basic problem of Puerto Rico is that of finding a way to make possible an increased income to support its people on the basis of their American citizenship. It would be helpful if there could be a full utilization of its tropical agricultural and industrial resources in such a manner as to supplement and complement, rather than to compete with agriculture and industry on the mainland. Only in part can this be accomplished by a program of relief spending. Something more fundamental would be the coordination of an agricultural and industrial development and provision of proper credit facilities for Puerto Rico's farmers and tradesmen.

If capital can be made available to these deserving Puerto Rican farmers and businessmen for the next few years, it is reasonable to believe that Puerto Rico's economy will reach a more stable level. No solution of the island's economic difficulties, however, will avail that does not take into account its startling overpopulation.

OFFICE OF EDUCATION

The end of a 70-year association as a member of the Department of the Interior marked the close of the fiscal year 1939 for the Office of Education. At the beginning of the new fiscal year of 1940 the Office was transferred to the newly created Federal Security Agency under the Reorganization Plan.

During the year the Office of Education undertook many comprehensive studies and cooperative arrangements for the promotion of educational activities. Study discussion outlines were provided, radio educational programs were presented, and study guidance and allied activities were carried on. The radio project went into its fifth year of demonstration and service with a growing interest in radio education by schools and colleges, civic groups and mass audiences in general.

A large number of studies of a variety of educational problems was carried forward by the Office during the year. These included one of public-school buildings erected with P. W. A. aid; another of the

planning and design of school auditoriums; study of rural-school units; a survey of Federal funds made available for educational purposes, and a survey of "parent education" programs. Publication of reports and studies by the Office continued. A total of 61 new publications was delivered from the Government Printing Office during the year, and 69 new manuscripts were completed and sent to the Printing Office. Approximately 100,000 copies of *School Life*, the journal of the Office, were distributed to libraries and universities as well as to college and school administrators, teachers, and other citizens.

During the year the Office continued its educational work in the C. C. C. camps. A total of 91.5 percent of all enrollees attended organized classes. Thirty-seven percent of all C. C. C. enrollees participated in academic classes, and 47 percent attended vocational classes. Job-training instruction was taken by 65 percent of the corps members, and classes in first aid, safety, health, and related subjects were attended by 59 percent. A total of 8,445 youths who entered the corps illiterate were taught to read and write during the year. Approximately 5,000 enrollees completed the elementary grades and received eighth-grade diplomas, while 1,049 qualified for high-school diplomas. Ninety-six were given college degrees.

CIVILIAN CONSERVATION CORPS

During the fiscal year five agencies of the Department continued to utilize C. C. C. camps that were assigned to various types of conservation projects throughout the country. These agencies were the General Land Office, the Office of Indian Affairs, the Bureau of Reclamation, the National Park Service, and the Division of Grazing.

In addition to its C. C. C. work to control Federal coal-deposit-outcrop fires in Wyoming with which it has been occupied since 1933, the General Land Office assumed technical supervision of four new camps established on the O. and C. lands in Oregon. These camps were engaged in general forest conservation work, assisting the O. and C. Administration to administer the lands on the sustained-yield basis. A total of 27 miles of truck trails was constructed during the year and the camps worked on 72 forest fires which covered a total of 39,000 acres. One lookout tower was constructed and a total of 27 miles of forest-protection telephone line was strung, in addition to which 40 miles of line were maintained and improved. Some 400,000 trees were planted on 500 acres of cut-over land.

C. C. C. projects were carried forward on 71 Indian reservations. The construction of basic structures for the conservation of land and water and the preservation of forest stands and forage cover was continued. A number of dams were erected to supply water for range stock and also for subsistence gardens. Land heretofore open and exposed to trespass was protected by new and rebuilt fences. During the year 500 springs, small reservoirs and well-development jobs were completed. One hundred and fifteen impounding and large diversion dams were erected; 950 miles of fence were installed; 900 miles of truck and horse trails were put in, and insect- and tree-pest control was established over 100,000 acres.

On reclamation projects, C. C. C. camps continued their work of rehabilitation by the development of supplemental water supplies, the construction of new projects and the establishment of recreational facilities at irrigation reservoirs. Excellent progress was reported in the replacement of deteriorated water-control structures, in the lining of porous sections of canals and in the checking of canal erosion. The better physical condition of reclamation projects resulting from these permanent improvements was reflected in increased savings of irrigation water.

The National Park Service continued its cooperation with the States and directed C. C. C. projects for the protection, conservation and development of park and recreational areas in all parts of the country. During the year operations were carried on by an average of 54,410 enrollees in 311 camps, including 91 in continental national parks and 220 in State, county, and metropolitan parks and areas.

The Department was assigned 1,600 corps members for projects in the Territories and insular possessions, and their operations covered a wide range of permanent improvements and rehabilitation work. A record of accomplishment was marked up in the spring of 1939 by camps assigned to the grazing service for conservation projects on the Nation's public range lands. The work included spring developments, wells for water storage, rodent control, and construction of range fences, cattle guards, stock driveways, and the like.

Under the Division of Grazing the C. C. C. has constructed projects far beyond the scope or resources of any individual or group and consequently has made possible steady improvement of the range. This program has proven of inestimable value to livestock owners and doubtless has gone a long way to assist in the stabilization of the industry.

GENERAL LAND OFFICE

Effective measures to guard the valuable resources on the public domain against unwise use resulted from the work of the General Land Office during the fiscal year. Efficient administration of the conservation program was insured through the establishment within the Office of a branch of planning, use, and protection. This branch will handle range problems, including the analysis and classification of the public lands.

In spite of its increased responsibilities, the activities of the General Land Office were conducted at a profit. The total receipts during the fiscal year amounted to \$7,756,288. This was nearly four times the amount of expenditures for its operation.

The discovery and development of a supply of potash on the public lands was an outstanding accomplishment of the conservation work of the General Land Office during the year. The domestic potash industry is now drawing heavily on these deposits. This essential plant food can now be produced without dependence upon foreign sources of supply. Another result of this development has been to bring down the price of fertilizers.

Important steps were taken by the General Land Office during the year for the protection of forest resources on 2,500,000 acres of public lands, including the O. and C. and the Coos Bay wagon-road revested land grants. This work was carried forward by the Land Office in cooperation with the office of the Director of Forests. Under this program an adequate supply of timber will be provided to insure continued operation of the lumbering industry upon which many communities in Oregon depend.

The conservation of the forage and water supply facilities on approximately 50,000,000 acres of public domain outside of Federal grazing districts was advanced through the issuance of limited grazing leases. A new range improvement program was inaugurated in some areas.

GEOLOGICAL SURVEY

The Geological Survey completed its sixtieth year with notable achievements and discoveries. Among the more unusual investigations was one of geologic factors that might have a bearing on the prevalence of tuberculosis in certain areas. A new mineral, shortite, was discovered in Wyoming and its nature and occurrence are being investigated. A two volume lexicon of geologic names, long in preparation, was published during the year.

Topographic surveys, Federal and cooperative, covered more than 27,000 square miles in 45 States and in Puerto Rico. A feature of the work was the increased use of stereophotogrammetric equipment, by which mapping is accomplished through the use of aerial photographs—a method in which the Geological Survey was a pioneer.

In the administration of the land classification and mineral leasing activities of the Geological Survey more than 9,500 reports were made regarding the mineral resources, water power, or storage possibilities of the public land, and the Government's ownership of reserves of coal, oil, gas, potash, phosphate, and other minerals. Technical supervision was given to more than 8,500 properties containing oil and gas and to more than 600 containing coal and 100 containing other minerals. On Indian lands more than 4,900 oil and gas leases were supervised. Mineral production during the year from public and Indian lands and naval petroleum reserves under the supervision of the Survey had an estimated value of \$83,000,000. The revenue received by the Government as a result of this production amounted to about \$9,500,000.

Water investigations were successfully prosecuted. As the result of a succession of alternating droughts and disastrous floods, the Nation has become more water-conscious and the problem of water conservation and protection has increased in public importance. Necessary planning is dependent upon adequate information on the flow of streams and the amount of underground water. During the year the funds made available for this work, including Federal and State and municipal contributions, were greater than ever before, and further increases are in prospect.

BUREAU OF MINES

The last fiscal year brought tangible results from the long efforts that have gone into the safety and investigational activities of the Bureau of Mines. Two remarkable records were achieved. The year was the first since mining became an important economic enterprise in the United States in which not a single major disaster occurred. When the long list of disasters which had occurred in American mines is considered, this result is memorable.

The second record was made when 120,733 persons in the mineral and allied industries earned certificates to show that they had completed Bureau of Mines courses in first-aid and mine rescue. This is the largest number ever trained in a 12-month period, and brings to more than 1,265,000 the total of those who have received such training. As a result of the Bureau's work, more than 1,000,000 coal miners have completed safety and rescue courses.

The relative immunity from mine fires and explosion disasters now enjoyed in the United States can be traced to the activities of the Bureau. Practically all of the accepted reforms in mining practices now in use in the minerals and allied industries can be attributed to the development of better methods by the Bureau.

The Bureau completed many special studies during the year on other health and safety problems of the minerals industry. The Health Division continued its investigations of the effect of the work on the health of employees in the mineral industries. In cooperation with the United States Public Health Service and the Port of New York Authority a study of compressed-air illness was completed. Valuable data and experience were gained that should be helpful in combating hazardous conditions incident to work in compressed air.

In production fields, the record was equally impressive. The Amarillo helium plant of the Bureau produced 6,301,000 cubic feet of helium during the fiscal year, of which the Army and Navy purchased 72 percent. Other shipments went to the Bureau of Standards, the Bureau of Entomology and Plant Quarantine, the Geological Survey, and the Weather Bureau for various experiments, researches, and uses. Approximately 1,022,000 cubic feet of helium were delivered for non-Government use, mainly for lighter-than-air craft and for treatment of respiratory diseases. Deliveries for non-Government use increased more than fourteenfold over those of the previous year.

The first sale of a substantial amount of helium ever made to a foreign government was effected at the end of the fiscal year after other previous offers to purchase were refused. A contract was executed in June for the sale of 220,000 cubic feet of the gas to Poland, and it left the Amarillo plant shortly afterwards. The helium was to be used for experimental stratosphere flights in Poland.

One phase of the Bureau's technological work during the past year, which bore promise for the future, consisted of comparative tests by the coal-hydrogenation laboratory on various types of low-rank coals from the West. It never has been profitable to market some of the western coals, but the reserves of them are so prodigious that

they offer a potential source of motor fuel in spite of the relatively low recovery of liquid hydrocarbon from them. Excellent work was accomplished in these studies.

As a component part of the Government's broad conservation plans, the Bureau studied various mineral deposits which occur in areas which will be served by large hydroelectric projects now under construction. Promising opportunities for new domestic industries were indicated. The ceramics industry, for example, shows possibilities of becoming more self-sufficient as a result of Bureau investigations in regions served by the Tennessee Valley Authority, Boulder Dam and Grand Coulee Dam.

A steady and persistent advance in hitherto unexplored fields of petroleum and natural gas technology marked the activities of the Petroleum and Natural-Gas Division. The results of the Bureau's investigations in the field of petroleum and natural gas technology have been so cordially received by the industry that the Bureau's engineers are in great demand for the study of problems applicable, not only to the whole industry, but also to individual deposits and fields. Studies were continued on well-spacing and related activities.

The vital importance of strategic minerals, made even more pressing by world conditions, received considerable attention from the Bureau. The Bureau was represented on the Mineral Advisory Committee to the Army and Navy Munitions Board, and upon commodity subcommittees investigating the national defense aspects of our mineral supply. As a part of this work, extensive reports were prepared on various phases of the deficient mineral problem for the use of the military branch of the Government. In addition, the Bureau did extensive work with regard to strategic minerals for the Congress, other Government agencies, industry, and the public.

CONCLUSION

The accomplishments which I have briefly outlined tell the story of the progress that we have made in safeguarding our storehouses of natural wealth. Conservation, however, should not be a static thing. It must be a dynamic, growing thing. We must work ceaselessly, if we are actually to attain the goal that we have set—the prudent use of the wealth which Nature has bestowed upon this Nation.

The vitalization of our conservation drive and the expansion of its front was given enormous help at the close of the fiscal year by your Reorganization Plan No. 2. This brought about changes that had long been desirable and which went far to consolidate the conservation activities of the Federal Government in this Department. The changes referred to resulted in placing within the Department of the Interior the Bureau of Biological Survey and the Bureau of Fisheries. The inclusion of these two great natural-resource agencies, together with a third, the Bituminous Coal Division, has made possible a blending of effort which will result in imparting the strength of unity to the many component parts that go to make up physical

conservation as we know it. In my estimation, no other single step for many years has so effectively forwarded the conservation movement.

As the result of these changes, this Department is in a better position than ever before effectively to continue and to improve upon real conservation as applied to our lands, range, minerals, forests, water power, wildlife, and the many other constituents which make up that body of basic wealth which we term our natural resources.

Very respectfully,

Harold L. Ickes

Secretary of the Interior.





MOUNTAIN STREAMS ROAR GREETING TO GENERAL LAND OFFICE ENGINEERS ENGAGED IN SURVEYING UNDER
NATIONAL CONSERVATION PROGRAM.

GENERAL LAND OFFICE

Fred W. Johnson, *Commissioner*

MARKED progress in the safeguarding from unwise use of valuable resources on the public domain of the United States resulted from the work of the General Land Office during the fiscal year.

Keeping pace with the national conservation program, this Office, which for 150 years has served as the real-estate agency of the Government, successfully effected the important transition from previous activities involving disposal of the public lands, to operations designed to bring about their management and prudent use.

Efficient administration of the vital conservation program was insured through the establishment within the General Land Office of a Branch of Planning, Use, and Protection, to handle problems of research and surveys, improvements of the range, and analysis and classification of the public lands. Office reorganization also included the establishment of a Branch of Adjudication and an Administrative Division.

Despite its increased responsibilities, activities of the General Land Office were conducted at a profit, the total receipts during the fiscal year amounting to \$7,756,288.71. This was nearly four times the amount of expenditures for its operation.

Popular interest in the conservation activities of the Office was met with the issuance of a new series of informational bulletins, describing its work.

By direction of Congress, the General Land Office during the year compiled and issued the 1938 edition of the Official Map of the United States.

Regulation of grazing on the vacant and unreserved public lands, in order to prevent soil erosion and damage to valuable forage and water resources, formed an important feature of the conservation work. This regulation was accomplished by the issuance of leases under section 15 of the Taylor Grazing Act of 1934. While the primary objective sought by the issuance of the leases was the control of grazing for the purpose mentioned, the leases during the fiscal year produced a revenue of \$137,365.13, an increase of \$89,433.06 over the receipts of the previous year.

The transition from the oil and gas permit-lease system to an exclusive system of leasing under the act of August 21, 1935 (49 Stat. 674), a conservation measure, was advanced well on its way to completion during the year. Four thousand eight hundred and fifty-four prospecting permits terminated, approximately one-half of which were exchanged for leases, leaving only 2,015 permits outstanding, which will terminate during the forthcoming year.

In addition to the large number of oil and gas leases which were issued, initial steps have been taken, because of threatened drainage, to sell at public auction leases on numerous tracts of known oil lands.

The domestic potash industry, largely dependent on federally owned potash deposits, continues to draw more heavily on these deposits to meet foreign competition and to supply the farmers with this essential plant food. One notable result of its discovery in and production from public lands has been to bring the price of fertilizers more nearly within the means of the consumer.

Due to the application of scientific principles to agriculture and to the industries, many minerals in the public lands heretofore considered of slight value are now being generally exploited. Among these, vermiculite is in great demand for insulation against heat and cold, gypsum and limestone for the conditioning of soils, and several species of clays for refining both vegetable and mineral oils. Increased activity in connection with these minerals, particularly those found near the surface, will result in erosional and other problems which will require study.

Conservation of valuable timber resources on 2,500,000 acres of revested Oregon and California Railroad and Coos Bay Wagon Road grant lands, in Oregon, was advanced by the activities of the General Land Office. Placing the lumbering operations in the area on a sustained-yield basis for the first time, administration of the tracts is being carried forward to insure the economic stability of the communities dependent upon the industry.

CADASTRAL ENGINEERING SERVICE

The Cadastral Engineer Service of the General Land Office executes cadastral surveys and resurveys of the public lands in the United States and Alaska; supervises mineral surveys for patent purposes; prepares the field notes and plats for such surveys; and acts as custodian of the records.

Field projects were carried on in 24 States, the Territory of Alaska, and in the District of Columbia, under 220 separate groups,

111 of which in 17 States were resurvey projects. A total of 36,249 miles was surveyed and resurveyed, embracing 5,992,000 acres, in addition to engineering investigations, miscellaneous surveys, and special projects which are not measurable on a quantity basis.

The preparation of plats and field notes of surveys is practically current. There were constructed 248 township base plats, 124 color overlay sheets, 124 supplemental plats, 115 special plats of miscellaneous surveys, and field notes were prepared in final form for the permanent record for these surveys. In addition, 116 mineral surveys, embracing 419 locations, were examined, platted, and approved.

Cooperative surveys and resurveys in response to requests from other Federal agencies were made for the Division of Grazing, Bureau of Reclamation, National Park Service, Geological Survey, and Office of Indian Affairs of the Department of the Interior, the Forest Service of the Department of Agriculture, and the Department of Justice.

Accepted surveys and resurveys.—There were accepted and placed on file plats representing 1,444,180 acres of original surveys of public lands, and, in addition, 1,914,355 acres of lands resurveyed, comprising an aggregate area of 3,358,535 acres.

Maps, plats, and diagrams.—The wall map of the United States was revised and the 1938 edition printed and delivered.

There have been prepared 204 miscellaneous maps, plats, diagrams, and tracings.

Photolithographic copies, etc.—There were sold 6,421 photolithographic copies of township plats, for which \$3,210.50 was received; and 9,756 copies were furnished other Bureaus for official use. There were 2,882 maps mounted and distributed for official use, and distribution was made of 5,133 map publications and 126,259 circulars.

CIVILIAN CONSERVATION CORPS

Conservation of Forest Resources on the Oregon and California Revested Lands

Under the supervision of the Oregon and California Administration, General Land Office, the C. C. C. is providing facilities for the proper protection, reforestation, and utilization of the forests on approximately 2,500,000 acres of Oregon and California revested lands.

In addition to fire-suppression and fire-protection improvements, a permanent transportation system is being developed in order that

the most efficient conservation of the timber resources can be realized through the carrying out of a planned sustained-yield program. By having a road system in existence the young and thrifty forest can be left to reach maturity, while the older and more decadent timber can be utilized to supply the demands of industry.

The work of the Oregon and California C. C. C. camps is a sound financial undertaking, as the cost of operation of the camps eventually will be realized many times by the country through increased timber values and more efficient utilization.

Control of Coal Fires

Under the supervision of the General Land Office, the C. C. C. has done work of inestimable value in controlling underground coal fires which have been destroying valuable Federal coal beds in public lands in the vicinity of Little Thunder Basin, Wyo. To the close of the fiscal year, 19 separate coal-bed fires had been worked upon, 12 of which are reported extinguished or under control. On the remaining 7 work is progressing satisfactorily, giving promise that eventually they will be extinguished. In addition, there are 10 other coal-bed fires in the vicinity of Gillette, Wyo., upon which work must be done for several years, if these irreplaceable natural resources are to be saved from complete destruction.

REVESTED OREGON AND CALIFORNIA RAILROAD AND RECONVEYED COOS BAY WAGON ROAD GRANT LANDS

The act of August 28, 1937 (50 Stat. 874), provided a comprehensive land-use conservation program, requiring extensive field examination and classification of all the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands.

Pending completion of such classification and determination of the annual sustained-yield capacity of the timber-growing area, and in order to prevent the shutting down of operating lumbering concerns with resultant unemployment and hardship to a large number of persons, timber cutting proceeded under temporary regulations. On July 7, 1938, however, permanent regulations governing the sale of the timber, were approved. Regulations governing the issuance of temporary 1-year grazing leases were approved July 6, 1939.

Transactions concerning the revested and reconveyed lands follow:

Timber sales.—During the fiscal year 151 sales of timber on the revested Oregon and California railroad grant lands were made, involving 16,151.17 acres of land, containing 319,178,000 feet, board measure, of timber, with a value of \$609,595.16. Total sales to June

30, 1939, aggregated 1,369, involving 160,702.30 acres, containing 4,412,428,000 feet, board measure, of timber, with a total value of \$8,539,778.01.

Nine sales of timber on the reconveyed Coos Bay Wagon Road grant lands were made during the year, involving 727.30 acres of land, containing 24,348,000 feet, board measure, of timber, for which the sum of \$48,776.46 has been or will be received. Total sales to June 30, 1939, 138, involving 21,582.08 acres, containing 854,138,000 feet, board measure, of timber, with a total value of \$1,993,078.50.

Timber-cutting permits.—Seventy-eight timber-cutting permits were issued under the act of August 28, 1937, involving 1,566,000 feet of timber for which \$3,362.00 has been received.

Extensions of time.—Three extensions of time within which to cut and remove the remaining timber on 240 acres of revested land were granted under the act of May 19, 1930 (46 Stat. 369). Total extensions granted, 71.

Timber rights terminated.—Rights under timber patents or sales were terminated in 124 cases.

RECEIPTS AND EXPENDITURES

The total cash receipts from leases, sales, and other disposals of public lands (including receipts from copies of records, sales of Government property, etc.) were \$7,719,579.53, and from Indian lands \$36,709.18, an aggregate of \$7,756,288.71, all of which was deposited in the Treasury. The total expenditures from appropriations made for the conduct of the Bureau were \$2,046,201. The excess of receipts over expenditures was \$5,710,087.71. The receipts were \$691,086.26 less than for the year 1938, but were larger than for any other year since 1927.

Receipts under mineral leasing acts.—Receipts from bonuses, royalties, and rentals under laws providing for the leasing rights on the public domain (including royalties and rentals on potash deposits and royalties on coal leases in Alaska) aggregated \$5,932,492.14 of which \$5,741,333.35 was received under the act of February 25, 1920 (41 Stat. 437). The largest receipts under this act were from lands in California, the amount being \$2,705,140.39. Wyoming was second with \$1,715,298.60. Receipts from other States follow: New Mexico, \$832,717.91; Colorado, \$135,168.12; Utah, \$130,739.66; Montana, \$112,744.13; Louisiana, \$77,242.65; North Dakota, \$23,591.22; Alabama, \$5,838.97; South Dakota, \$1,366.31; Arizona, \$480; Washington, \$358.61; Idaho, \$326.25; Kansas, \$180; Nebraska, \$140; and Nevada, 53 cents. Under the provisions of the mineral

leasing act cited, each State receives 37½ percent of the receipts from the public lands within its borders, the reclamation fund receives 52½ percent, and the other 10 percent remains in the Treasury of the United States as a part of the general fund.

Receipts under the Taylor Grazing Act.—Fees for grazing within grazing districts, by districts and by States, and fees and rentals for leases issued under section 15 of the act.

Receipts from Grazing Districts

	District No.	By districts	By States	Fees and rentals under sec. 15	State total
Arkansas.....				\$5.00	\$5.00
Arizona.....	1	\$17,529.03			
	2	8,281.05			
	3	1,704.80			
	4	12,524.89			
California.....	1	11,285.13	\$40,039.77	21,045.35	61,085.12
	2	20,668.51			
Colorado.....	1	18,405.00	31,953.64	9,034.18	40,987.82
	2	2,885.99			
	3	13,835.18			
	4	6,501.25			
	6	5,036.48			
Idaho.....	1	38,082.55	46,663.90	3,181.24	49,845.14
	2	35,932.02			
	3	19,009.63			
	4	12,476.32			
Montana.....	1	342.36	105,500.52	5,272.30	110,772.82
	2	5,729.96			
	3	5,684.74			
	4	943.91			
	5	5,962.25			
Nebraska.....			18,663.22	19,023.32	37,686.54
Nevada.....	1	54,400.66		50.18	50.18
	2	37,464.15			
	3	14,012.90			
	4	27,199.75			
	5	2,324.68			
New Mexico.....	2	19,564.65	135,402.14		135,402.14
	3	37,199.98			
	4	27,960.98			
	5	8,779.57			
	6	48,998.16			
Oklahoma.....			142,503.34	4,971.63	147,474.97
Oregon.....	1	1,233.92		9.00	9.00
	2	20,971.95			
	3	21,124.79			
	4	15,176.92			
	5	5,450.43			
	6	7,577.68			
	7	816.66			
South Dakota.....			72,352.35	5,957.08	78,309.43
Utah.....	1	7,749.44		1,117.80	1,117.80
	2	19,540.37			
	3	31,918.40			
	4	12,081.00			
	5	17,305.53			
	6	18,498.46			
	7	17,679.80			
	8	12,458.61			
			137,231.61		137,231.61

Receipts from Grazing Districts—Continued

	District No.	By districts	By States	Fees and rentals under sec. 15	State total
Washington.....				\$2, 187. 37	\$2, 187. 37
Wyoming.....	1	\$27, 382. 85			
	2	18, 355. 12			
	3	23, 092. 39			
	4	31, 987. 49			
	5	6, 910. 99			
			\$107, 728. 84	65, 510. 68	173, 239. 52
Grand total.....			838, 039. 33	137, 365. 13	975, 404. 46

Distribution of receipts.—Receipts from all sources, aggregating \$7,756,288.71, as shown above, are distributed under the law approximately as follows: Reclamation fund, \$3,373,636; for range improvements, \$243,851; to public-land States and certain counties within such States, \$3,003,118; to various Indian tribes, \$41,640; and to the general fund of the Treasury, \$1,094,044.

Under the provisions of the Taylor Grazing Act, the States within which the lands are situated receive 50 percent of the receipts from public lands and 25 percent of the receipts from ceded Indian lands; 25 percent of the receipts from both public and ceded Indian lands is available, when appropriated by Congress, for range improvements; 50 percent of the receipts from ceded Indian lands is credited to the Indians; and the balance is credited to the general fund in the Treasury.

Five percent of the net proceeds from cash sales of public lands is paid to the public-land States within which such sales were made, and the balance of such receipts from States named in the Reclamation Act is credited to the reclamation fund; the reclamation fund and the States involved receive 90 percent (52½ percent and 37½ percent, respectively) of the receipts under the Mineral Leasing Act and of receipts from potash deposits leased under the act of February 7, 1927; receipts from sales of reclamation townsites and camp sites and from royalties and rentals from potash deposits leased under the act of October 2, 1917, are credited to the reclamation fund; 75 percent of the receipts from the Oregon and California Railroad grant lands is paid to the counties within which the lands are situated and 25 percent is credited to the general fund of the Treasury. Twenty-five percent of the proceeds of land and timber in the forfeited Coos Bay Wagon Road grant will be paid to Coos County, Oreg. The receipts from Indian lands (except 37½ percent of royalties from Red River oil lands which is paid to the State

of Oklahoma in lieu of taxes) are deposited in the Treasury to the credit of the various Indian tribes. All other moneys are deposited in the Treasury to the credit of the general fund.

The following table shows in detail the distribution of the receipts, insofar as is possible before final settlement of all accounts by the General Accounting Office:

	Distribution in the Treasury				
	General fund	Reclamation and range improvement	State and county funds	Trust funds	Total
Sale of public lands.....	\$50,254.23	\$176,797.50	\$9,460.48	-----	\$236,512.21
Fees and commissions.....	19,848.54	71,867.32	-----	-----	91,715.86
Receipts from mineral leases.....	594,068.25	3,014,200.01	2,153,000.00	-----	¹ 5,761,268.26
Receipts from Oregon and California Railroad grant lands.....	98,972.68	-----	296,918.02	-----	² 395,890.70
Receipts from Coos Bay Wagon Road grant lands.....	19,042.53	-----	6,333.62	-----	³ 25,376.15
Receipts under Taylor Grazing Act.....	238,472.26	243,851.11	482,323.37	\$10,757.72	⁴ 975,404.46
Potash royalties and rentals.....	13,134.88	105,740.78	49,255.80	-----	⁵ 168,131.46
Copying fees.....	17,356.97	-----	-----	-----	17,356.97
Power permits.....	14,230.46	-----	-----	-----	14,230.46
Reclamation town lots.....	-----	5,030.31	-----	-----	5,030.31
Sales and leases of Indian lands.....	-----	-----	5,826.63	30,882.55	⁶ 36,709.18
Miscellaneous (including sales of standing timber, coal leases, and town lots in Alaska, rent of land etc.).....	28,662.69	-----	-----	-----	28,662.69
Total.....	1,094,043.49	3,617,487.03	3,003,117.92	41,640.27	7,756,288.71

¹ First and fifth columns contain \$19,934.91 royalties received in Wyoming under the act of June 26, 1926.

² 75 percent of the receipts from the Oregon and California Railroad grant lands is paid to the counties in lieu of taxes and 25 percent is covered into the general fund.

³ 25 percent of the receipts from the Coos Bay Wagon Road grant lands is paid to Coos County, Oreg., in lieu of taxes.

⁴ 50 percent of the receipts from public lands and 25 percent of the receipts from ceded Indian lands are paid to the State; 25 percent of the receipts from both public and ceded Indian lands are available, when appropriated by Congress, for range improvements; 25 percent of the receipts from public lands is covered into the general fund of the Treasury; and 50 percent of the receipts from ceded Indian lands is credited to the Indians.

⁵ All receipts under the act of Oct. 2, 1917 (a total of \$36,782.65), and 52½ percent of the receipts under the act of Feb. 7, 1927 (a total of \$131,348.81), are credited to the reclamation fund. 37½ percent of the receipts under the latter act is payable to the States and 10 percent is covered into the general fund.

⁶ Included in receipts from Indian lands is \$15,537.71 royalties on oil and gas from Kiowa, Comanche, and Apache lands, south half of Red River, Okla., of which the State receives 37½ percent in lieu of taxes.

REPAYMENTS

The act of June 16, 1880 (21 Stat. 287), and the act of March 26, 1908 (35 Stat. 48), as amended by the act of December 11, 1919 (41 Stat. 366), provide for the return of moneys received in connection with the disposal of the public lands and covered into the United States Treasury.

Repayment may be made to the land applicant or his heirs or assigns in all cases where lands have been erroneously sold, where payments have been made in excess of lawful requirement, and where applications, entries and proofs have been rejected, in the absence of fraud or attempted fraud. Under the above cited laws there were stated during the fiscal year 49 accounts allowing repayment of \$6,513.19, and 19 claims were denied. The number of claims allowed includes five accounts granting repayment of \$715.75 received in connection with sales of Indian reservation lands and repaid from Indian trust funds.

GENERAL STATEMENT

The number of letters and reports received for consideration or answer from all sources was 137,804 and 79,467 letters and decisions were written. The latter figure, an increase of 7,258 over the number of letters and decisions written during the preceding year, does not include letters prepared for signature in the Department.

There were outstanding on June 30, 1939, 5,051 mineral leases, permits, and licenses covering 5,780,701 acres. The number outstanding at the close of the preceding year was 9,350, embracing 12,227,111 acres. The decrease to a large extent is accounted for by the conservation measures which have been put into effect, by reason of which many oil and gas, permits were terminated. There also were outstanding on June 30, 1939, 4,190 leases other than mineral, embracing 6,916,900 acres. The number outstanding at the close of the preceding year was 1,682, for 3,585,977 acres. The increase to a large extent is due to the issuance of additional grazing leases under section 15 of the Taylor Grazing Act.

There were made during the year 686 original entries and selections, covering 301,740 acres. This figure includes 150,748.81 acres selected for the California State park system, under the act of June 29, 1936 (49 Stat. 2026). There also were made 3,948 final entries and selections for 1,198,080 acres. Many of these entries were made prior to the general withdrawal of the public lands from entry, or subsequent thereto but based on rights initiated prior to such withdrawal. Patents and certificates issued for 5,687 entries and selections having a total area of 3,281,224 acres. This amount includes 1,298,790 acres of school section land, patented to the State of Montana under the act of June 21, 1934 (48 Stat. 1185). A total of 1,441,472 acres was patented during the year with a reservation of mineral in some form to the United States. The total area patented, as of the close of the fiscal year, in which mineral in some form was reserved aggregates 45,087,270 acres.

On June 30, 1939, 5,098,829 acres were embraced in unperfected entries upon which proof of compliance with the law was not due or had not been presented. In addition, there were pending applications for exchange under section 8 of the Taylor Grazing Act involving about 2,476,000 acres of privately owned and state school land and about the same area of public land.

Exchanges of national forest lands required the examination of abstracts of title involving 177,273 acres.

There were furnished during the year 43,744 certified and uncertified copies of papers, plats, field notes, patents, etc., for which there were received amounts aggregating \$12,348.25. In addition, there were furnished for official use, by this and other departments and agencies, 27,938 copies of such items.

Five hundred and eighty-three letters were written in connection with pending and proposed suits, applications of attorneys for admission to practice before the Department, and charges preferred against patentees and others.

Thirty-two civil suits were recommended to cancel leases for oil, gas, and coal, to cancel patents issued through fraud, to cancel a right-of-way; and to recover damages for loss of property in connection with timber and grazing trespasses. Twenty-three cases were won and one was lost. Judgments and compromises were obtained in the amount of \$73,819.54. Payments in the amount of \$30,946.37 were collected.

Twenty applications of attorneys for admission to practice before this Department were received. Favorable recommendations were made in connection with 18, and unfavorable recommendations in connection with 2. Recommendation was made that 1 agent be dropped from the roll.

There were decided on principles of equity and referred to the Board of Equitable Adjudication and confirmed 1,392 homestead entries of public lands, 41 homestead entries of revested and reconveyed lands in Oregon, 39 homestead entries of ceded Indian lands, 19 reclamation homesteads, and 55 desert-land entries.

Reports were submitted on 117 Senate and House bills, and necessary orders and instructions have been prepared or are in course of preparation in connection with bills, public and private, affecting the public lands, which were enacted into law. Reports were made on 7 enrolled bills.

On June 30, 1939, there were 309 permanent employees of the General Land Office in Washington, 76 in the district land offices, 16 in the Oregon and California Administration, 1 in the Range Development Service, and 158 in the Public Survey offices.

RANGE DEVELOPMENT SERVICE

Establishment of Service

The Range Development Service of the General Land Office was established pursuant to the provisions of the Taylor Grazing Act of June 28, 1934 (48 Stat. 1269), as amended by the act of June 26, 1936 (49 Stat. 1976), and as supplemented by the Second Deficiency Appropriation Act, fiscal year 1938 (52 Stat. 1129). The act last cited appropriated \$60,000 for this work, with the limitation that the expenditures should not exceed 25 percent of the receipts during the fiscal years 1938 and 1939. The receipts for these years were \$185,297.20.

Allocation of Funds

The act which made the funds available does not contain any restriction as to the distribution thereof by States. It is deemed appropriate, however, that the distribution be made in an equitable manner. The funds available from receipts for the fiscal years 1938 and 1939 were apportioned for equal expenditures in the States of Arizona, Montana, and Wyoming, which contributed approximately 79 percent of the receipts. As additional funds become available, it is the intention to make proper proportionate distribution thereof.

Range Program

The range improvement program was put into operation toward the latter part of January 1939 in the State of Arizona. The type of improvement necessary varies with the locality and local conditions. In Arizona, the development of water for stock driveways and the erection of drift fences were the principal types of improvements which were made. As a general rule, range improvements which would benefit several stockmen were given preference and improvements on the public domain inuring to the benefit of individual lessees were secondary in consideration.

Cooperative Agreements

To eliminate maintenance charges of range improvements, cooperative agreements were entered into between the United States and individual lessees, whereby the lessees agreed to contribute toward the construction of the improvements, either in money, labor, or material, or part or all of these items, whenever such agreements were acceptable to the lessees, and the lessees agreed to maintain the improvements. This permitted a more comprehensive program

to be undertaken with the available funds than otherwise would have been possible.

Range Improvements

Between January 17, 1939, the date of approval of the range program by the Secretary of the Interior, and June 30, 1939, 23 range improvements benefiting 437,342 acres were constructed in the State of Arizona, at a total cost of \$10,516.84. The United States expended \$8,676.11 and the individual lessees contributed \$1,840.73.

MINERAL LEASES AND MINING CLAIMS

Oil and gas leases and permits.—At the end of the fiscal year 1938, there were outstanding, 1,070 leases, issued as rewards upon discoveries, area 451,821.81 acres; 167 new leases, embracing 93,324.29 acres, were issued. Exclusive of 22 naval-reserve leases for 9,627.99 acres, there were outstanding on June 30, 1939, 1,237 leases, embracing 545,146.10 acres. One hundred sixty-eight noncompetitive leases, issued under the amendatory act of August 21, 1935, embracing 184,008.28 acres, and outstanding on June 30, 1938, were increased by the issuance of 235 new leases, area 117,675.91 acres and 723 leases issued through exchanges for oil and gas prospecting permits, on an area of 1,443,257.12 acres; of the entire total, 10 leases were canceled, involving 4,385.85 acres, leaving on June 30, 1939, 1,116 leases, embracing 1,740,555.46 acres. The 7,370 oil and gas prospecting permits, embracing 11,221,621 acres, and outstanding on June 30, 1938, decreased when 723 permits, embracing 1,443,257.12 acres, were exchanged for noncompetitive leases and 5,386 were canceled and terminated by operation of law on an area of 8,084,427.68 acres, while 16 new permits were issued and 15 were reinstated on a combined area of 57,499.13 acres, leaving outstanding on June 30, 1939, 2,015 permits embracing 3,185,692.45 acres.

Coal, potash, sodium, phosphate, and sulphur, permits and leases, and coal licenses.—On June 30, 1938, 374 coal leases, covering 71,698.44 acres, were outstanding; 27 new leases issued for 4,755.86 acres and 32 were canceled on an area of 7,892.10 acres, thereby decreasing the coal leases to 369, covering 68,552.20 acres. On the date named, 160 coal permits embraced 126,926.13 acres; 21 new permits on 9,243.80 acres were issued and 60 permits embracing 43,602.45 acres were canceled and terminated by operation of law, leaving outstanding 121 permits containing 92,566.48 acres. Also outstanding on June 30, 1938, were 92 coal licenses, embracing 3,599.26 acres, 8 were issued for 717.55 acres and 15 area 1,015.10 acres, were canceled and expired by limitation, leaving 85 licenses embracing 3,301.71 acres.

Potash leases on June 30, 1938, numbered 10 and covered 25,505.49 acres; 6 were issued for 15,377.17 acres, thereby increasing the leases to 16 and the area to 40,882.66 acres. Twenty-three potash permits also outstanding and covering 54,696.47 acres, decreased, when 10 permits expired and 1 was canceled on a combined area of 39,421.98 acres, to 12 permits, embracing 15,274.49 acres. The 7 phosphate leases, embracing 3,292.90 acres, outstanding on June 30, 1938, were not affected by any changes. Two sodium leases, area 801.70 acres, were outstanding on June 30, 1938; 1, involving 390.16 acres, was issued, bringing the total to 3, embracing 1,191.88 acres. On June 30, 1939, there were 47 sodium permits embracing 65,586.36 acres; 21 sodium permits embracing 31,699.29 acres were issued and 25, involving 30,543.28 acres, were canceled or expired by limitation, leaving 43 sodium permits covering 66,742.37 acres. There was no change in the status of the 27 sulphur permits, embracing 17,508.01 acres, which were outstanding on June 30, 1938.

Mineral applications and entries.—One hundred and twenty-one mineral applications were disposed of during the year, leaving on hand 85 for approximately 4,936.80 acres. Five hundred and eighty-one mineral entries were disposed of, of which 152, embracing 8,829.23 acres, were patented, leaving on hand on June 30, 1939, 105 mineral entries embracing approximately 6,098.40 acres.

Mineral contests.—Eighty-two mineral contests were disposed of during the year, leaving 35 contests pending on June 30, 1939.

RIGHTS-OF-WAY

Three hundred and five right-of-way applications were approved and 25 stock-raising reservoir applications were disposed of. In addition, 29 right-of-way applications were rejected, and 39 other actions were taken.

FEDERAL RECLAMATION PROJECTS

There are 45 Federal reclamation projects in 14 western States, 35 of which are operated in whole or in part by the water users. There are, in addition, 5 Indian reclamation projects, the irrigation features of which are under the supervision of the Office of Indian Affairs.

Two hundred and seventy-nine original reclamation homestead entries and 141 assignments of such entries were received; and 185 reclamation entries, containing 17,277.78 acres, were patented.

DESERT-LAND ACT

Ninety-three entries, involving 11,662.50 acres, were patented under the Desert-Land Act.

CAREY ACT

Carey Act segregations amounting to 29,062.76 acres were considered. One application under the act of March 15, 1910 (36 Stat. 237), involving 601,445.20 acres, was rejected.

PITTMAN ACT

Twenty cases were received under the Pittman Acts of October 22, 1919 (41 Stat. 293), and September 22, 1922 (42 Stat. 1012). Action was taken in 19 cases.

SWAMP AND OVERFLOWED LANDS

Under the Swamp-land acts, there were approved and patented to the States 4,205.25 acres and claims for 393.30 acres were finally rejected. New claims were asserted for 1,928.43 acres.

STATE GRANTS AND SELECTIONS

New indemnity school-land selections embracing 25,418.19 acres were received and selections amounting to 226,498.55 acres were approved and title conveyed to the States. Such selections involving 9,558.24 acres were canceled. Pending selections under quantity grants to States, for specific purposes, embracing 28,143.28 acres, were approved and title conveyed to the States.

Applications for patents for granted school sections under the provisions of the act of June 21, 1934 (48 Stat. 1185), were patented during the year to the extent of 1,298,789.83 acres. New applications were received, embracing 972,803.51 acres. Such applications pending at the end of the year embrace 1,486,394.65 acres.

New applications by the various States, under the Taylor Grazing Act, for exchanges of lands were received, embracing 141,227.93 acres. Sixty-two patents were issued, containing 109,269.02 acres, with a reservation of all minerals to the United States, excepting two patents embracing 240 acres. The rejected and relinquished applications involved 163,323.76 acres.

RAILROAD GRANTS AND SELECTIONS

Three new railroad selections were received, embracing 11,969.96 acres, and 2,403.04 acres were certified or patented in lieu of such grants.

ALASKA

On June 30, 1939, there were 34 fur-farm leases outstanding, covering approximately 172,650 acres, the annual rental of which is \$1,052.56. Two new leases and 2 renewal leases were issued, 12 renewal leases await execution by the applicants, 1 application for lease awaits

a field report, and 5 applications for new leases await further evidence to be supplied by the applicants.

Twelve grazing leases, covering approximately 884,633 acres, from which the sum of \$1,523.65 was received, were outstanding on June 30, 1939. One new lease was issued, two leases were canceled, three applications await field reports, two were suspended, two were held for rejection, and three were rejected.

The sale of 5-acre tracts in Alaska for homesites or headquarters was considered in 132 cases and 7 patents issued for a total of 20.10 acres, from which the sum of \$237.95 was received.

AVIATION LEASES

On June 30, 1939, 26 aviation leases covering 13,122.63 acres and five beacon light permits covering 954.84 acres were outstanding. Two leases were canceled, one lease was issued, and five applications for lease await evidence to be supplied by the applicant.

COLOR OF TITLE

General color-of-title claims were considered in 182 instances, and 7 patents issued for a total of 386.32 acres, from which the sum of \$1,709.82 was realized. One patent issued for a Texas-New Mexico color-of-title claim involving 16.90 acres, from which the sum of \$133.10 was received. One case under a special act involving lands in Utah claimed under color of title awaits the survey of the land involved.

EXCHANGES

The extinguishment of private holdings within various Government reservations is accomplished through the medium of various exchange laws enacted by Congress.

Forest exchanges were considered in 905 instances and 15 patents issued. The Secretary of Agriculture was notified in 72 cases that permits could issue for timber selected in exchange and title to 177,273.22 acres was accepted for inclusion in national forests.

Two applications involving the exchange of privately owned land in forests for public domain land in New Mexico failed of consummation pursuant to a decree of the Court of Appeals for the District of Columbia.

Two applications for exchange in the interest of establishing the Bear River Migratory Bird Refuge in Utah are in the process of consummation, after being involved in the Federal courts for several years.

A total of 247 cases of private exchanges under section 8 of the Taylor Grazing Act have been received and six of these were con-

summated during the year and title on behalf of the United States was accepted to 6,963.63 acres. On June 30, 1939, there were pending 183 applications involving 364,567.03 acres of public land and 371,932.12 acres of privately owned land.

GRAZING LEASES

During the year 2,341 offers of grazing lease were made under section 15 of the Taylor Grazing Act, involving approximately 3,647,130.16 acres of land with an annual rental of \$61,259.54. On June 30, 1939, there were 2,106 applications for lease pending, the majority of which await reports from the Division of Investigations. Seventy-one term leases were renewed during the year, in which the acreage totaled 67,271.56 and the rental total was \$1,503.95.

INDIAN LANDS AND CLAIMS

Entries and sales of ceded Indian lands were considered in 855 instances and 67 patents issued for 12,032.58 acres, from which the sum of \$21,583.96 was realized.

Under the various exchange laws affecting Indian reservations, four exchanges were consummated and 640 acres were added to various Indian reservations.

The matter of fee and trust patents was considered in 750 instances and 48 fee patents issued for 4,918.48 acres and 32 trust patents for 4,499.35 acres. There were 239 reissue patents involving 42,283.45 acres.

Homesteads by Indians were considered in 104 instances and 63 patents issued for 12,543.31 acres.

One contract involving the sale of pine timber on Chippewa Indian lands in Minnesota was canceled and the deposit therewith was forfeited, while the timber on the other two contracts was cut and removed and the contracts completed.

Ninety-one patents embracing 13,291.90 acres were issued on non-Indian claims.

PRIVATE LAND CLAIMS

Private land claims derived under foreign sovereignties were considered in 203 instances and 49 patents issued for a total of 41,207.69 acres.

TIMBER

Sales of dead, down, or damaged timber were considered in 76 instances and the sum of \$7,475.55 was received therefrom. Twenty-four actions were taken involving free-use timber permits.

TOWN LOTS

Three hundred and seven actions were taken in town-site cases and 127 town-lot and town-site patents issued, from which was received the sum of \$6,404.

TRESPASS

Trespass cases on public lands required actions as follows: Timber 423, the sum of \$8,027.68 being accepted in settlement; coal 76, the sum of \$101.87 being accepted in settlement; grazing, four; gravel, four; gypsum, six; stone, four.

MISCELLANEOUS

Actions were taken and patents issued as follows: Abandoned military reservations 58, with eight patents issuing; military bounty land warrants 12, with three patents issuing; cash and credit entries 35, with 21 patents issuing; Arkansas drainage 208, with one patent issuing; forest lieu selections 44, with two patents issuing, donation claims one, with one patent issuing; parks six; preemptions 10, with three patents issuing; quitclaims 27, with 12 quitclaim deeds issuing; riparian rights three; scrip 17, with one patent issuing; small holding 16, with seven patents issuing; soldiers' additional homestead entries 288, with 22 patents issuing, and trade and manufacturing sites 32, with one patent issuing.

HOMESTEAD ENTRIES

Actions were taken in homestead cases as follows: On final and commuted homesteads, 5,545, of which 3,734 were patented; on second-entry applications, 100; on applications to amend, 48; on applications for leaves of absence and for extensions of time to establish residence, 563; on original entries, 4,077; and on appeals, 6,906.

PUBLIC SALE AND TIMBER AND STONE APPLICATIONS

Six hundred sixty-five actions were taken on public-sale applications, 139 of which were patented; and 44 actions were taken on timber and stone applications, seven of which were patented.

FILING OF PLATS OF SURVEY

Letters of instruction were issued for the filing of 355 plats of survey for lands in States in which there are district land offices. Fifty plats were directly filed by this office in connection with which 13 public notices were prepared for lands in States in which there are no district land offices.

NATIONAL FOREST HOMESTEAD LANDS

Three thousand seven hundred thirteen acres in national forests which had been listed for homestead entry under the act of June 11, 1906 (34 Stat. 233), were returned to national forests by revocation of the listing orders and 197 acres were restored to homestead entry under the act.

CONTESTS, OTHER THAN MINERAL CONTESTS

Four hundred thirty-one contests, including both Government and private, were considered. Approximately 111 hearings were held in Government cases. At the close of the year about 37 contest cases were pending.

TRACT-BOOK NOTATIONS

More than 100,000 notations were made on the tract books. This includes 13,735 homestead applications and other miscellaneous cases, 2,710 grazing applications, 3,469 final and cash certificates, 2,185 oil and gas lease applications, 118 coal lease applications, 272 original entries and 455 plats.

Withdrawals and classifications.—Six hundred and eleven Executive and other orders were noted. These include withdrawals for stock driveways, national forests, restored lists, power-site reserves and classifications, grazing districts, and mineral and other classifications and revocations thereof.

Relinquishments.—Entries numbering 462 were relinquished and noted.

Status cases.—Status was furnished in 23,932 cases for adjudicating clerks.

Township diagrams.—Diagrams showing disposals and status, in 1,181 townships and fractional townships, were made for this and other bureaus.

WITHDRAWALS AND RESTORATIONS

The area of existing public water reserves was increased by 2,585 acres, the lands classified as valuable for hydro-electric power purposes were increased by 15,135 acres, and the areas in reclamation projects under the act of June 17, 1902, were decreased by 121,360 acres.

The Carlsbad Caverns National Park in New Mexico was enlarged by the addition of 39,488 acres. Five new national monuments were created, four were enlarged and one was reduced in the

public-land States and the Glacier Bay National Monument in Alaska was enlarged, the total increase amounting to 393,177 acres in the States and 1,134,720 acres in Alaska. The area of the national forests was increased by 2,521,351 acres. Fifty-one new wildlife refuges were established and seven were enlarged, while two new cooperative game ranges were created within a grazing district in Arizona, resulting in a total increase of 1,874,184 acres. Withdrawals amounting to 1,560 acres were made for air-navigation sites for the Department of Commerce and 215 acres were released from former withdrawals for such use. Three tracts of public land aggregating 280 acres were sold under the recreation law, two to the State of Oregon and one to the State of Minnesota; one petition was denied in part, one lease was issued, one canceled and one expired, and 200 acres were released from a recreational withdrawal. Two new stock driveways were created and seven enlarged.

All stock driveways within grazing districts in Oregon and Utah and driveway withdrawals within certain grazing districts in Arizona, Colorado, Idaho, Montana, and New Mexico, and other driveways outside of grazing districts were reduced or revoked, resulting in a net decrease of 2,242,275 acres.

All projects of the Resettlement Administration, or the Farm Security Administration have been transferred to the Department of Agriculture for administration under the Bankhead-Jones Farm Tenant Act. A withdrawal of 480 acres was made at the request of that Department for use in connection with a project in New Mexico, and 1,104 acres of purchased lands were transferred by Executive order from its jurisdiction to the jurisdiction of this Department. One withdrawal previously made in aid of such projects was enlarged, two reduced, and one revoked, resulting in a net increase of 738 acres.

A withdrawal of 640 acres in California was made for the use of the Navy Department and a tract of 20 acres was withdrawn for the use of the State of Arkansas in cooperative forest-protection work. Other reservations for various purposes were increased by 59,604 acres. Withdrawals for lighthouse purposes were reduced by 4,239 acres, and a withdrawal for classification and use as a grazing project of all public lands in four counties in South Dakota was reduced as to 32,592 acres reserved for the Badlands National Monument. General withdrawals for classification were reduced by 1,477,790 acres through the placing of the lands involved in withdrawals for specific purposes.

MINERAL LAND WITHDRAWALS AND RESTORATIONS

A summary of the acreage involved in mineral land withdrawals and restorations for the year ended June 30, 1939, is as follows:

Kind	Outstand- ing with- drawn June 30, 1938	Withdrawn	Restored	Outstand- ing with- drawn June 30, 1939
Coal.....	27,545,363		¹ 214,785	27,330,578
Helium.....	8,420			8,420
Mineral.....	8,507			8,507
Oil shale.....	5,989,949			5,989,949
Petroleum.....	5,563,663		² 309,439	5,254,224
Phosphate.....	2,292,988			2,292,988
Potash.....	9,414,816			9,414,816
Total.....	50,823,706		524,224	50,299,482

¹ Lands restored in the State of Montana by Executive Order of May 17, 1939.

² Lands restored in the State of Utah by Executive Order of May 27, 1939.

Tables showing in condensed form some of the activities and accomplishments of the General Land Office during the fiscal year are as follows:

Mineral Leases, Permits and Licenses Outstanding on June 30, 1939

Class	Leases		Permits		Licenses	
	Num- ber	Acres	Num- ber	Acres	Num- ber	Acres
Oil and gas.....	1,237	545,146	2,015	3,185,692		
Oil and Gas Act, Aug. 21, 1935.....	1,116	1,740,555				
Coal.....	369	68,552	121	92,566	85	3,301
Potash.....	16	40,882	12	15,274		
Phosphate.....	7	3,292				
Sodium.....	3	1,191	43	66,742		
Sulphur.....			27	17,508		
Total.....	2,748	2,399,618	2,218	3,377,782	85	3,301

Summary of Areas on Outstanding Leases, Permits and Licenses as of June 30, 1939

	Num- ber	Acres
Leases.....	2,748	2,399,618
Permits.....	2,218	3,377,782
Licenses.....	85	3,301
Total.....	5,051	5,780,701

Leases Other Than Mineral, Outstanding on June 30, 1939

Class	Number	Acres	Class	Number	Acres
Term grazing leases under Taylor Grazing Act ¹	4,093	5,830,743	Recreational leases: Act June 14, 1926.....	16	14,655
Grazing leases, Alaska.....	12	884,633	Act June 30, 1932.....	1	20
Fur farm leases, Alaska.....	34	172,650	Leases for water wells.....	2	80
Aviation leases and permits: Leases.....	26	13,123	Total.....	4,190	6,916,900
Beacon permits.....	5	956			
Leases for mineral and medicinal springs.....	1	40			

¹ In addition, there were outstanding on June 30, 1939, 841 offers of term grazing leases covering 1,783,513 acres.

Original Entries

	Public land		Indian land	
	Number	Acres	Number	Acres
Homesteads:				
Stockraising.....	47	23,690	2	1,273
Enlarged.....	28	7,631	1	315
Reclamation.....	59	6,845	4	542
Forest.....	7	650		
Sec. 2289 et al.....	237	27,566	25	2,413
Total homesteads.....	378	66,382	32	4,543
Deserts.....	25	3,070		
State selections.....	43	156,027		
Railroad selections.....	1	7,011		
Applications and filings.....	154			
Miscellaneous.....	53	64,707		
Total.....	654	297,197		
Indian land as above.....	32	4,543		
Grand total.....	686	301,740		

Final Entries

	Number	Acres	Number	Acres
Homesteads:				
Stock raising.....	2,054	966,413	106	49,531
Enlarged.....	168	40,437	35	7,766
Reclamation.....	100	9,991	39	3,533
Forest.....	32	3,197		
Commuted.....	8	998	29	2,041
Section 2289 et al.....	719	68,900	55	5,461
Total homesteads.....	3,081	1,089,936	264	68,332
Deserts.....	87	11,571	5	586
Public auction.....	119	14,226	6	1,088
Timber and stone.....	12	892		
Mineral.....	127	7,818	13	945
Miscellaneous.....	212	2,340	22	346
Total.....	3,638	1,126,783	310	71,297
Indian land as above.....	310	71,297		
Grand total.....	3,948	1,198,080		

Patents and Certificates

	Num- ber	Acres		Num- ber	Acres
Homesteads:			Mineral.....	152	8,830
Stockraising.....	2,558	1,268,213	Railroad.....	5	2,403
Enlarged.....	309	76,555	Special acts.....	192	1,460,933
Reclamation.....	185	17,278	Miscellaneous.....	1,039	85,514
Forest.....	39	3,610			
Section 2289 et al.....	967	102,058	Total patents.....	5,687	3,054,685
Total homesteads.....	4,058	1,467,714	Certified to States.....		226,539
Deserts.....	95	11,863			
Public auction.....	139	16,989	Grand total.....	5,687	3,281,224
Timber and stone.....	7	439			

¹ Includes 1,298,790 acres of school section land, patented to the State of Montana under the act of June 21, 1934 (48 Stat. 1185).

LANDS PATENTED WITH MINERAL RESERVATIONS

The following table shows the areas patented during the year and the total areas heretofore patented in which minerals in some form have been reserved to the United States:

	Fiscal year	Total
	<i>Acres</i>	<i>Acres</i>
Stockraising act, all minerals reserved.....	1,268,213	31,709,557
Other acts:		
All minerals reserved.....	148,672	755,164
Coal only reserved.....	7,479	10,819,481
Some named minerals reserved.....	17,108	1,803,068
Total.....	1,441,472	45,087,270





A NEW DAY DAWNS FOR SEMINOLES, AS CHILDREN ATTEND INDIAN SCHOOLS IN FLORIDA.

OFFICE OF INDIAN AFFAIRS

John Collier, Commissioner

INTRODUCTION

THE program of Indian Service is, as it has been, to help the Indians, racially and individually, to survive, to support themselves economically, and to determine their own future. This program is not of one uniform pattern. It is manifold and various, because the situation of Indians is extremely various.

Indian life in these recent years has become a rich and intense drama. The striving of the will of individuals and of tribes is the moving force in this drama. Indians have turned from anticipated death to anticipated life, from fatalism to action, from inferiority to healthful pride. Thousands of Indians now are consciously aware that prosperity and greatness can come to them, but only through the things they themselves may do.

Indian lands have ceased to dwindle; they are slowly increasing. Indian natural resources have ceased to disappear through wasteful overuse; instead they are coming back, in some cases very slowly, toward primal efficiency and adequacy. Indians have ceased to be inactive while white men do their work; instead, 4,491, or more than half of the regular employees of the Indian Service, and more than 70 percent of the emergency employees, are Indians. The Indian death rate is no longer menacing the survival of the race; instead, the yearly increase of Indians exceeds that of any other population group. Indians no longer are the solitary element in the country's population existing in a totally unorganized status; instead, political and industrial self-government is being achieved by an overwhelming preponderance of the tribes.

The last fiscal year witnessed a maturing of program, a great quantitative increase of Indian participation, the correction of many errors of detail in organization and procedure, the solidification of that program which holds the future of the Indians. Indian Service and the Indians alike became more consciously the possessors of a new goal, of the technics appropriate to the new goal, and of a spirit of victory. How far off that goal is, how many the shortcomings, how baffling and, indeed, as yet wholly unsolved, are some of the

central problems this report will tell in more or less of detail. But its main message is the true one, that Indians, physically and spiritually, are coming into their own.

INDIAN SELF-GOVERNMENT

Indian self-government has continued to be a major interest of the Indian Service—to restore tribal government where it had become inoperative or ineffective, and to give it a broader basis in law. Functioning self-government is the end we are seeking, whatever we attempt in the Indian Service; and the degree to which the Indians achieve self-government is the measure of success of Indian administration itself.

The problem, then, is service-wide. The Indian Reorganization Act provided machinery for facilitating tribal organization and it gave impetus to the program, but if there had been no Indian Reorganization Act, we would still have been concerned with the development of self-government. We would have been challenged by the situation in which one-third of a million United States citizens found themselves, of having too little voice in the management of their lives and their resources. And after all our effort, however wise and benevolent, we would still have had to put the question to ourselves, how effectively do Indians now manage their affairs?

Indian self-government, if it is effective and if it is all we expect it to be, will not be stereotyped. It may not be as varied as, historically, tribal governments were in their original growth, but it should be at least as varied in form and content as the needs of the Indian people, acted upon by their living traditions, require, and that will permit of considerable range.

Thus far there have been numerous instances in which Indian tribes have written constitutions establishing a representative form of government and have added to the model ideas and methods which derive directly from their own background. Papago, with a council composed of representatives of its historic villages, and with the representatives of those villages directly and immediately accountable to the local electorate, is such a bridging of tradition and modern democratic practice. The Pawnee Indians in Oklahoma achieved a similar coupling of old and new by setting up in their tribal organization two councils, one a council of old headmen, who were given full authority to act within certain areas of tribal interest, while a representative business committee was set up to carry on the routine business of government. The Sioux Indians of the Rosebud Reservation have endeavored to bring to the surface of everyday affairs

the half-buried and half-forgotten *tiospaye*, which in the past was a natural unit of social action.

Those are cases in which native pattern added to modern representative government has made the modern type of government effective. There are other instances in which representative government has kept a native form from collapse and disintegration. At Santa Clara Pueblo, for example, a 50 years' history of factionalism had reduced the Pueblo to a state of dangerous inaction. In the circumstances, a written constitution was perhaps the only method by which the factional stand-off could be ended and control of community affairs restored to the people. At Hopi, likewise, a written constitution was the beginning of bridging chasms of jealous separatism which had been growing between the nine villages over years and centuries.

As against these instances, there are groups whose native pattern, archaic though it be, is self-contained and capable of adjusting the needs of its people to the pressures of today. The Pueblo of Acoma exists under an archaic political form, which yet is resilient enough to carry through on schedule an involved program of stock-reduction, involving sacrifices to individual members of the Pueblo.

SELF-GOVERNMENT AND THE INDIAN REORGANIZATION ACT

The actual process of organizing Indian tribes, of drafting and voting on constitutions and charters, went at a slower pace this last fiscal year, as compared with other years. This statement does not apply to Alaska, as will be pointed out later. Between July 1, 1938, and June 30, 1939, a total of 12 tribes, including 5 Oklahoma tribes, adopted constitutions and bylaws, and in the same period 8 tribes, including 4 Oklahoma tribes, incorporated. At the close of the fiscal year 93 tribes (including 17 Oklahoma tribes) had constitutions, and 64 (including 8 Oklahoma tribes) had charters of incorporation.

The Alaska amendment to the Indian Reorganization Act permits native groups "not heretofore recognized as tribes or bands" to organize on the basis of a community of interest, whether of residence, association, or occupation. This means that native villages in Alaska may organize. The Indian Service maintains schools in about 100 villages, and it is possible to count on organizing about that number. The task of initiating the Alaska work has been slow and time-consuming, but it is expected that another fiscal year will show a rapid rise in accomplishment. On June 30, 1939, 7 villages had drafted constitutions and charters and on the same date at least 35 villages were waiting to hold elections as quickly as our field personnel could

get to them. The volume of organization work in Alaska should be increasing for several years.

The mere drafting and adopting of organization documents is only a preliminary to a much larger task of getting Indians acquainted with the possibilities opened up to them and of getting Indians to take full advantage of these opportunities. Therefore, it is most emphatically true to say that the work of organizing Indian tribes is hardly started, and that the amount of persistent and patient effort required is greater today than it was two years ago, when, in one year, 56 tribal elections were held in connection with the ratification of constitutions and charters (fiscal year 1937). The emphasis now is directed to the effective Indian use of the organization tools, to the drafting of law and order codes, the correction of census rolls, the enactment of land-management laws, the development of systems of tribal revenue, including the making of budgets, and the enactment of numerous miscellaneous ordinances and resolutions covering hunting and fishing, the adoption of new members, the leasing of tribal lands, the protection of public safety and morals—responsibilities which fall upon any people which assumes powers of municipal government.

It is apparent also that as the Indian tribes begin to function under their constitutions and charters, they will discover deficiencies in constitutional provisions. A number of elections on constitutional amendments have already been called, and it may be expected that elections of this sort will increase in the future.

Formal tribal organization has brought to the surface many of the grievances and maladjustments which have existed in past years but which have been only imperfectly expressed. Factions have existed for many years on some reservations, without coming seriously to the fore. With the establishment of tribal governments, this factionalism has burst forth rather vociferously at times. Some of the critics of tribal government have pointed to this fact as damning evidence of the failure of the whole plan of reorganization. Such criticism hardly merits comment, since it is based on a rather shallow conception of Indian character. Indians, it assumes, are incapable of managing wisely and, when given an opportunity to manage, make a muddle of their affairs. The fact is that responsibility cannot be learned without assuming responsibility. Progress is never made without facing a good chance for failure. The Indians, for the first time, have the opportunity either of failing or of succeeding, and, in any case, of learning to succeed through failing.

There is a widespread conviction throughout the Service that the economic rehabilitation of the Indian and his future welfare depends more largely upon the ability of the personnel of the Indian Service and the Indians themselves to engender indigenous leadership and machinery for an efficient and orderly self-government than upon any other factor.

INDIAN INCOME

Ten years ago the Meriam report ¹ on Indians and Indian administration stated that "an overwhelming majority of the Indians are poor, even extremely poor." Today Indians are still poor, and many of them live just above the minimum of subsistence. A very few are wealthy; many are in great poverty.

It is always difficult to obtain accurate data on income of individuals and families even of white people living largely on earned cash income. It is particularly difficult, therefore, to secure reliable data on the money value of the income of Indians, much of whose support takes the form of goods and services obtained without a direct expenditure of cash, and whose money receipts come from a variety of sources, both earned and unearned. Accordingly, efforts to obtain such information for Indians living on reservations have been only partly successful, and the results up to the present time are not deemed of sufficient accuracy to warrant their presentation in detail.

A few generalizations can be made, however, concerning the relative importance of the various sources of Indian income, and their significance in relation to the stability of Indian economy.

Over one-fifth of all Indian income is unearned income from non-relief sources, such as leases, rentals, and royalties. More than another fifth of their entire income during the calendar year 1938 was from relief sources, indicating that Indian income depends to a considerable extent on the uncertain availability of funds from emergency governmental agencies. Less than a third of the total income was obtained by the Indians through their own individual operations, primarily agricultural pursuits, which constitute about 22 percent of total income. Indian economy is, in general, still very insecure, and still largely dependent upon sources other than the Indians' own efforts.

The major task of the Indian Service for many years must be to increase, and especially through education in land use and the pro-

¹ Meriam and Associates, *The Problem of Indian Administration*, Baltimore, Johns Hopkins Press, 1928, p. 1.

viding of opportunities for further economic development by their own labor, the Indians' income and to improve their living conditions. Many of them are located in areas where the natural resources are meager. Somehow these resources must be augmented. Additional lands must be provided, overgrazed ranges must be restored, flocks and herds must be improved, and arts and crafts and other sources of supplemental income must be developed. Irrigation projects must reclaim desert lands, and Indians must be taught to make more effective use of all existing resources.

INDIAN ECONOMIC REHABILITATION

Rehabilitation in its broadest sense of reestablishment on a firm basis has made a steady advance during the past fiscal year. Appraisal of the records in the field indicates substantial and heartening progress.

Over 54,800,000 acres of farming and grazing land are the main assets of a people whose inherent love for land is unquestioned. The Extension Division by its carefully planned programs has demonstrated the possibility of translating these acres into cattle, sheep, and other livestock which will provide the necessities for a livelihood. This involves, of course, in addition to material and practical assistance, the awakening of the individual and tribal consciousness to the potentialities of their present resources, the future results predicated by consistent and honest labor and the obligation for loan repayments. Patience, kindness, tolerance, and appreciation of racial characteristics, are part of the equipment of the successful Indian Service worker.

At the close of the fiscal year 1939, loans totaling \$4,938,365.20 had been granted to chartered corporations, credit associations, cooperatives, and individual Indians, from the revolving credit fund established by the Indian Reorganization Act. Of this amount, \$2,656.869 had actually been advanced for use of Indians to aid them in their various business enterprises. In addition, allotments amounting to \$150,068 were made on 22 reservations not operating under the Reorganization Act, from gratuity funds appropriated by Congress. Also, there was allotted \$465,207.71 from tribal funds to 31 reservations.

In the local administration of revolving credit funds a superintendent, in a recent report, states his belief that Indians have actually learned more about credit and doing business on a business basis during the last 2 years than in any 25 years hitherto. Cooperative associations of many types, such as lumber mills, livestock associa-

tions, fisheries, etc., which have gained in number and members during the last 3 years are exercising a marked influence not only on the reservations immediately served but on others which have kept a most observant eye on their economic progress. Due to the particular trust status of Indian resources and the consequent inability to offer these as security to regular credit agencies, the revolving credit fund affords the only means by which many sound enterprises may be developed over such widely separated sections as the Lakes States, the Plains, the Pacific Northwest, southeast Alaska, and several of the Southern States. Outside of Oklahoma and Alaska, loans from the revolving fund are made only to chartered tribal corporations whose loan applications must be accompanied by a statement of a sound economic program, including security or other guarantees of repayment, terms of repayment, and plans for managing the credit business of the tribe. The tribes in turn re-lend to individual Indians.

In Oklahoma the Government makes direct loans to cooperatives, to credit associations, to individuals, as well as to chartered tribal corporations.

As an example of improvement in economic conditions made possible by use of credit, the following is quoted from a report of the Extension Agent of the Mescalero Reservation:

* * * The general attitude on the part of the Indians has improved and the Apaches are well on the road to permanent economic stability. Health conditions have improved greatly and there has been a 25-percent reduction in hospital cases on the reservation. This improved morale can be traced at least in part to the fact that the earned income per family rose from \$450 in 1935, to \$1,056 in 1937, indicating something of the achievement of a people who have gained confidence in their ability to do something for themselves.

Again, in 1920, over 1,000,000 acres of the total of 1,610,000 acres which constitute the San Carlos Reservation were leased to white cattlemen. The San Carlos Indians owned very few cattle, and by 1925 their inventory was 1,995 cows with a branding of 775 calves. The culling of this small herd, introduction of purebred sires, controlled breeding, improved range practices and the withdrawal of the range from white permittees has made possible the expansion of the cattle industry. The entire reservation is now stocked with Indian-owned cattle. At the close of the calendar year 1938, the Indians owned 32,018 head of beef cattle of excellent grade and quality. During 1938 the Indians sold 11,620 head of live animals and 210,540 pounds of dressed meat which brought a total of \$356,000, while the Indians themselves consumed more than 105,400 pounds of dressed meat.

The San Carlos reservation has 15 grazing districts, eight of which are now under the management of an Indian cattle growers' asso-

ciation. The other districts are to be consolidated with those under association management or reserved for breeding purposes and maintenance of the tribal herds. The tribe itself maintains two herds. One of these consists of some twelve hundred head of registered Herefords. Each year Indians of good character desirous of entering the cattle business are permitted by the tribal council to purchase choice yearling heifers from this herd for which they are given ample time to repay.

The cooperative livestock associations have encouraged individual initiative and participation and as a result, the Indians, through these associations, are managing the round-ups, sales, introducing improved range practices, and other matters affecting their livestock enterprises. Management and other necessary expenses are met by assessing a grazing fee of \$5 per head for each animal sold.

Isleta Pueblo in New Mexico has furnished another example. Four years ago the Pueblo's range was largely leased to whites. Drought-relief cattle were supplied the Isletas. In the spring of 1936, 864 grade Hereford cows, 65 registered Hereford bulls, and 247 heifer calves were turned over to the Pueblo of Isleta under a trust agreement which provided for the operation of the herd by a board of trustees. This agreement also provided for repayment to the United States for these animals within 3 years of one yearling heifer of like quality for each of the 864 cows and 65 bulls turned over to the Pueblo.

A board of trustees, composed of three Isleta Indians, handled this enterprise from the start and began making repayments in 1936. Payment for the entire herd was completed in accordance with the terms of the trust agreement in November 1938. According to the report of the board of trustees as of March 1, 1939, the Pueblo had a total of 598 cows, 62 bulls, 136 yearling heifers, 6 yearling steers, and 38 calves, valued at approximately \$40,960 and a cash bank balance of \$10,322.03. In other words, these Indians fulfilled their contract within the time specified and still retained about two-thirds of the number of the basic herd, had all debts paid and had a cash balance of \$10,322.03.

The cattle trusteeship has been extended and at the present time the management of the entire range of Isleta is in process of being vested in the trustees by the Pueblo. Conservative management is assured, and each year a part of the net earnings of the cattle business will go into the Pueblo's capital fund.

Other types of cooperatives are also being undertaken by the Indians, one of which is the Lyons Cooperative Association in Oklahoma. A number of full-blood Cherokee Indians living in the hilly eastern part of Oklahoma, where the land is ill adapted to general agriculture, decided to band together for the production of straw-

berries which can be grown in their section. An Indian was chosen to supervise the work and a loan of \$2,800 was made to the organization to enable the members to clear land and purchase the necessary plants. The members have now worked together for 2 years and their first crop was sold this past spring for over \$1,200. A payment was made on the loan and the balance distributed to members on the basis of their participation in the activity.

Another type of economic enterprise being generally undertaken is that known as a "corporate enterprise." Such enterprises are those which the tribe, as a corporation, can best undertake and perform. Commitments totaling \$769,756.30 had been made to such enterprises as of June 30.

The purposes of these enterprises are varied. A salmon cannery has been built in Alaska, a tourist-cabin enterprise is being operated in Wisconsin, a community dairy and farm are being conducted in California, an oyster culture enterprise in Washington, and a municipal water project in the Pacific Northwest. Several Indian tribal corporations are producing hay on tribal lands. An example of such a corporation haying enterprise is that being conducted by the Fort McDermitt Paiute and Shoshone Indians in Nevada. Hay land, which was purchased with funds provided under the Indian Reorganization Act, is being operated on a community basis, every family sharing in the proceeds in proportion to the services rendered to the project. This enterprise has now been operated successfully for 3 years. Individually owned cattle on this reservation increased from 200 head in 1935 to 1,200 head on January 1, 1939.

Another illustration of tribal corporate enterprise is a store being conducted by the Jicarilla Indians in New Mexico, where \$85,000 was loaned to this tribe for the purchase and operation of the store. The economic life of these Indians centers around sheep. The store supplies credit to carry the members through the year and markets the lambs and wool for them. The store has been in operation since November 1, 1937, and to December 31, 1938, sales of over \$135,000 had been made. The enterprise was operated very conservatively, overhead expenses being kept down to 6.7 percent and the stock turned approximately 5.4 times. A per capita distribution of profits of over \$2,500 and a patronage distribution of over \$2,500 were made to members of the corporation. A payment on the loan of \$8,500 plus carrying charges was made to the United States.

Of equal importance in the task of economic rehabilitation has been the aid extended in recent years by the purchase of additional lands. Under the Reorganization Act, Congress has appropriated \$3,450,000 for the purchase of lands for those Indians who have little

or none. With this money, there has been acquired to date a total of 228,517.16 acres at a cost of \$2,774,625.06.

In addition to the lands purchased under the Indian Reorganization Act, a number of purchases have been made under special legislation, and several with tribal funds.

Under the Arizona-Navajo Boundary Act of June 14, 1934, 480 acres were purchased during the fiscal year bringing the total of lands purchased under this act to 318,615.46 acres at a cost of \$462,615.22.

Under another specific act the Indian Office is completing a purchase program for the Goshute Indians of Nevada which will provide approximately 4,400 acres and which will automatically reserve for their use 65,000 acres of surrounding public-domain lands.

Other important land purchases during the year under specific legislation included 91 acres on the Wind River Reservation, 3,200 acres within the boundaries of the Navajo Reservation, 2,639 acres for the various Pueblos in New Mexico from tribal funds awarded pursuant to the Pueblo Lands Board Act, and approximately 5,000 acres for various tribes from their own tribal funds.

IRRIGATION PROJECTS

The irrigation projects operated by the Indian Office vary in size from a few acres, such as purely subsistence garden tracts, to projects containing 140,000 acres. Irrigation construction projects vary in magnitude from the construction of small diversion dams and ditches and installation of small pumps to the building of large dams, extensive distribution systems, and power plants. During the past several years, the use of irrigated lands by Indians has increased greatly and the Indians as tribes and individuals are showing a constantly growing interest in the development of their land resources. In addition to its regular operating and construction activities, the Irrigation Division has provided very essential support to the protection for Indian water rights.

Among the outstanding achievements of this Division during the past year have been the 70 projects on the Navajo Reservation where hundreds of Navajos are working with Government engineers to bring water to parched desert lands where the livestock industry can no longer support one of the fastest growing population groups in the Nation. The Navajos are not only working but donating labor to such an extent that on many projects only supervision and materials are furnished by the Government.

From reservation irrigation projects during 1937, the Navajos realized a crop income of \$270,661. A total of 1,142 families took

part in farming operations. Alfalfa and corn were the chief crops produced.

The importance of these figures lies in the fact that the Navajos spent \$1,400,000 for food last year which indicated that they are dependent to a great extent on commercial items in their diet. It opens up the possibility of supplementing their present production by increasing their farm acreage to supply the hay, grain, vegetables, and fruit which they now must buy.

It is estimated that an additional 5,500 acres under cultivation will produce all unprocessed agricultural products now imported. This would be equal in value to the \$225,000 worth of such products now purchased each year. An additional 14,000 acres would produce enough wheat to supply the \$325,000 worth of flour which Navajos now buy every year.

A significant forward step in the advancement of the Indian rehabilitation program was taken when the Bureau of the Budget and Congress approved the recommendation of the Indian Office that hereafter rehabilitation funds be made directly available to the Office of Indian Affairs. By this direct appropriation, there is assured a more positive measure of administrative control and expeditious handling of allotments. Such allotments by supplementing the activities of land acquisition, irrigation, extension, forestry, and education have enabled the Service to concentrate upon the integration of all activities, personnel, and allocated funds, and have thus consummated a more complete use of Indian resources. The major projects have involved the construction and repair of Indian homes and auxiliary farm buildings, and the construction of community buildings to house self-help activities. Successful settlement of Indian families on the land included not only the construction of buildings but water development, fencing, and other types of land improvement. Other projects included enterprises for canning, sewing, arts and crafts, and community and individual gardens. In these gardens, many thousands of pounds of foodstuffs were raised for immediate consumption and for preserving and drying.

The following report furnishes definite proof of the desire of Indian women to provide a normal mother's care for their families.

During the year 1938 a total of 10,871 meetings was held by Indian Service home-economics workers with Indian women, on canning, drying, clothing, home improvement, nutrition, child care, and other subjects. Objective progress over the previous year is shown in the following figures:

	1936	1937	1938
Number of quarts of fruits, vegetables, and meats canned	765,051	1,898,579	1,673,124
Number of pieces of clothing made under auspices of home extension groups	142,710	182,415	139,128

CIVILIAN CONSERVATION CORPS

The Civilian Conservation Corps has not only maintained its excellent work of the preceding years, but has perhaps surpassed it through the force of the momentum gained by past experience and the growing appreciation of all who were its beneficiaries. The work of the enrollees operating at 71 agencies is followed with the keenest interest by the Indian people.

Improved transportation, communication, and detection for forest-fire suppression, by the construction of truck trails, telephone lines, lookout towers, protection of timber stands, development of stock water facilities, fence construction to define range boundaries, and erosion-control projects are of far-reaching value. Indian leadership is encouraged. The enrollee training courses are worked out locally at each agency and embrace a wide variety of subjects. The training offered has been of such high character as to enable many enrollees to secure and hold remunerative positions in the business field.

SEMINOLE INDIANS

In no section of the country has the attitude of Indian wards become more responsive than among the Seminoles, who have steadfastly resisted all attempts at assimilation, and until very recently have even refused to permit their children to attend schools. During the past 3 years, 45,000 acres of fine grazing land have been acquired and are now in productive use, improved methods of agriculture have been established, 1,000 head of high-grade cattle have been added to the livestock inventory of the tribe, and a school has been opened where there is the heartiest response to the Government's educational program. Today the descendants of the great Osceola are utilizing their new lands to the fullest extent, roads in the Big Cypress country are being built largely by means of Indian labor, fences are being erected to take care of cattle and hogs, citrus orchards have been planted, and more than 1,000 palmetto houses have been built for them in the past 2 years. These measures are at last meeting with the most enthusiastic cooperation from those Seminoles, about one-half of the tribe, who have established themselves on the two new reservations.

CONSERVATION OF INDIAN RESOURCES

INDIAN LAND PROBLEMS

Indians have always been a rural people. In spite of efforts to urbanize large numbers of Indians and to assimilate them into white

city and town life, the great majority of Indians remain in home communities. The Indian's land is his greatest economic asset and his most precious heritage. His land problems must be solved, or the Indian will go down to extinction.

Using the Land on the Unallotted Reservations

The allotment of Indian lands met with sturdy resistance. The Menominees in Wisconsin kept their 200,000 acres, richly forested, in tribal ownership, as did the Red Lake Chippewas in Minnesota, with over 400,000 acres. A good many reservations, such as the Wind River in Wyoming and the Klamath in Oregon were only in part allotted, and the surplus, or a portion of the surplus, saved in tribal ownership. Only in the Southwest, in Arizona and New Mexico, did the Indians generally escape the march of allotment, though the irrigable lands of a few tribes were allotted. Today, the New Mexico Pueblos still retain their unallotted Spanish grants along the Rio Grande; the Mescalero Apaches in New Mexico, their 470,000 acres; the Fort Apache and San Carlos Apaches in Arizona, their 3,200,000 acres; the Hualpai in Arizona, their 900,000 acres; the Papago, their 2,600,000 acres; and the Navajos, their 16,000,000 acres.

On the unallotted reservations problems of land conservation are often acute. Already, overgrazing and misuse have seriously deteriorated the ranges and agricultural lands of Indians. The problems of conservation are further complicated by two basic factors affecting the present and future fate of Indians: (1) Rapidly increasing populations, and (2) fixed boundary limits, within which there is a steadily diminishing productivity of the land base.

The operation of these two factors can be illustrated by the situation to be found on the large unallotted reservation of the Papago Tribe in southern Arizona. The early habitat of the Papago was in southern Arizona, stretching from the city of Tucson across the Mexican border into the State of Sonora. On the reservation in the United States, around 6,200 Papago are now living. Originally they resided in 10 or 12 villages, but today, with their expansion helped by water developments throughout the reservation, they have 55 permanent and 34 seasonal villages. Originally, the reservation area was one of well-vegetated ranges, perennial grasses, desert shrubs, cacti and desert trees. Due to overgrazing, the ground cover has been depleted and accelerated erosion is active on most of the range. The digging of deep wells and construction of other water developments have enabled the population to spread out over the entire area, putting greater pressure everywhere. It is not known just how many head of livestock the Papago own; estimates run from

12,000 to 25,000, while the Soil Conservation Service has, after careful study, estimated the carrying capacity of the range at 9,675 cows year long.

The economy of the Papago today involves three elements: agriculture, livestock raising, and earned wages. As with the numbers of livestock, accurate figures of the relative proportion of these three sources of income are lacking. Studies made in 1936 would indicate that there was in that year an average family income of about \$530. Of a total income, \$775,000, about 16 percent came from domestic crops and wild food gathering and 24 percent from livestock, sold and consumed; in other words, less than half of the income came from the land. On the other hand, 52 percent of the total income was attributed to wage work (17 percent from Government wages in CCC-ID, 9 percent from private wages, and 18 percent from wages earned in the copper mines at Ajo, Ariz., located just off the reservation).

For the Papago and for all other Indians confronted with a like problem of resource conservation, the Government has the difficult task of education in sound land-use practices, and also of inaugurating practical conservation programs to save the soil from further exhaustion, to build it up, and to stabilize it on a permanent utilization basis. The problem takes in the whole complex of anthropology, sociology, economics, administration, and the technical disciplines related to soils science, agronomy, range vegetation, livestock management, and agricultural engineering.

The Problem of the Allotted Reservations

Whereas there is real hope and expectation that the resource problems of the unallotted lands can and will be solved, there is no such optimism in the United States that the tenure problem of the allotted reservations can or will be solved in time to rescue the land base for these Indians. To the tenure problem on such reservations are added acute problems of land use and conservation as well, making the total problem indescribably difficult. Since 1933, a deceptive economic recovery has been realized through the expenditure of large amounts of Government relief funds, evidenced to the Indians in wages, but aside from the construction of numerous conservation and other projects of great importance and value, the basic land use situation remains acute.

The inheritance and reinheritance of the original allotments has fractionated the interests of the heirs into smaller and smaller equities. As physical partition of an average trust allotment of 160 acres

into legal shares is impractical in most cases, the heirs have naturally preferred to secure the benefit of their equities in lease moneys. The Government has had to face increasingly the alternative of selling the land and dividing the proceeds among the heirs, or of retaining it in trust status—and going into the real estate leasing business.

In 1937 a study of the land pattern at the Lower Brule Reservation (South Dakota) showed that of an original area of 234,850 acres, 40 percent (94,000 acres) had been alienated to whites through the sale of fee-patented land; only 1 percent (1,450 acres) remained fee-patented in Indian ownership. Twenty-three percent (52,500 acres) of the total acreage was in "original" allotments and 25 percent (59,000 acres) in "heirship" status. The remainder was made up of one-tenth of 1 percent (240 acres) in tribal status; four-tenths of 1 percent (1,200 acres) set aside for agency and administrative purposes; and 10 percent (26,800 acres) of alienated fee-patent land repurchased for the Indians by the Government since 1934.

INDIAN FORESTS

Of the land in Indian ownership approximately 16,000,000 acres, or somewhat less than one-third, is forest land. Indian forests not only contribute millions of dollars annually to the Indians' income, but also serve a valuable protective function in regulating run-off, preventing erosion, and conserving water supplies.

The income from the forests constitutes the principal income for several thousand Indians.

Distribution of Indian Forest Volumes by States

State	Total volume (m. b. m.)	Commercial volume (m. b. m.)	Commercial cut-over vol- ume (m. b. m.)	Noncommer- cial volume (m. b. m.)
Arizona.....	10,901,416	6,253,121	118,017	4,530,278
California.....	583,800	359,700	-----	224,100
Colorado.....	372,569	240	-----	372,329
Idaho.....	152,282	120,237	7,416	24,629
Iowa.....	8,136	-----	8,136	-----
Michigan.....	16,336	8,152	8,184	-----
Minnesota.....	316,178	241,529	68,650	5,999
Montana.....	1,540,937	1,314,055	21,206	205,676
Nebraska.....	21,719	-----	21,519	200
Nevada.....	46,543	-----	43,200	3,343
New Mexico.....	2,722,731	1,269,548	189,981	1,263,202
North Carolina.....	160,278	93,000	67,278	-----
North Dakota.....	96,508	-----	-----	96,508
Oregon.....	6,651,467	6,064,512	457,895	129,060
South Dakota.....	106,831	-----	5,234	101,597
Utah.....	482,830	288,440	1,950	192,440
Washington.....	9,660,132	9,272,655	174,222	213,255
Wisconsin.....	613,014	506,406	106,608	-----
Wyoming.....	854,700	746,880	3,160	104,660
Total.....	35,308,407	26,538,475	1,302,656	7,467,276
Percent.....	100.0	75.2	3.7	21.1

On the basis of these estimates of volume the total stumpage value of the timber in Indian ownership amounts to \$87,462,597. The commercial timber represents about 82 percent of this amount while the reserve timber on the cut-over lands and the noncommercial timber represent 4 percent and 14 percent, respectively, of the balance. The values are distributed as follows:

		<i>Percent</i>
Commercial timber-----	\$71,917,909	82.2
Commercial timber, reserve stands-----	3,349,301	3.8
Noncommercial timber-----	12,195,387	14.0
<hr/>		<hr/>
Total -----	87,462,597	100.0

Although in most respects the management of the Indian forests is directed toward the same objectives sought in the management of a public forest, there are certain fundamental differences which give rise to radically different management problems. Indian lands are private property held in trust for the Indians by the United States and must be managed for the best benefit of the Indian owners and in accordance with specific statutes laid down by Congress. Moreover, by reason of the fact that the Indian forest property is so closely involved with the welfare of the Indian people, any plan of forest management which may be devised must take cognizance of the general Indian problem and be coordinated with the whole Indian Service program of social and economic betterment. This necessitates a far greater flexibility in long-term forest management plans than is ordinarily required or considered ideal from a purely technical standpoint. Constant adjustments must be made to meet the immediate pecuniary needs of individual Indians or to facilitate the educational and industrial advancement of the tribes.

Management and Development

The management of Indian forests has always been conducted well within income. In fact, the record discloses that during the past 29 years, namely from 1910 to 1938, inclusive, a cash return of \$44,169,940 was realized. The cost of administration during the same period totaled \$7,105,690, approximately 40 percent of which was borne by the Indians and the balance from Treasury funds. The total income includes \$5,346,108 received from the sale of grazing privileges for the fiscal years 1931 to 1938, inclusive, but does not include several million dollars of free-use grazing enjoyed by the Indians during this period. A consideration of the foregoing results reflects the following significant relationships, namely:

1. That the practice of conservation on Indian lands for the period 1910 to 1938, inclusive, reflects a ratio of costs to income of approximately 16 percent.

2. That the average annual cost of administration when compared with the area under management reflects a cost per acre of about 1 cent.

3. That the average annual income when considered with the capital value of the property under management reflects a ratio of income to capital value of about 2 percent per annum.

During the fiscal year just ended the Indians realized a cash income of \$1,168,235 from their forests in addition to their own free-use valued at \$273,610, thereby reflecting a grand total income from timber of \$1,441,845. Grazing resources during the same period produced a cash revenue of \$678,720 plus free grazing by the Indians valued at \$794,680 or a total return from grazing resources of \$1,473,400. These receipts from grazing when considered with the income from timber show a total gross revenue from forest and range resources of \$2,915,245. The total cost of administration for the fiscal year 1939 was \$442,480 distributed to the various funds as follows:

Administration of Indian forests-----	\$319, 365
Expenses, sale of timber (reimbursable)-----	110, 551
Suppressing forest fires on Indian reservations—Gratuity-----	11, 122
Suppressing forest fires on Indian reservations—Tribal-----	1, 443
<hr/>	
Total-----	442, 479

Of this total cost of administration \$111,993 was paid from Indian funds and the balance from Treasury funds, thereby indicating a net cost to the Government of \$330,487 for the practice of conservation on 46,000,000 acres of Indian land under management in the continental United States, or somewhat less than 1 cent per acre.

Generally speaking the forest and range business of the Indian Service during 1939 exceeded that of the preceding year. A comparatively large number of small timber sales were approved and completed. The degree of Indian participation in forest development increased somewhat, especially on the Quinault Indian Reservation and the Mescalero Indian Reservation. The use of the ranges by Indian stockmen increased substantially in practically all of the western range States.

Five new major timber sale contracts were approved during the year covering the sale of timber on the Colville and Klamath Indian Reservations. These sales involve a total volume of 152,609,000 feet board measure and have an estimated stumpage value of \$503,370.

The average price received for the timber was \$3.30 per thousand. Two major timber sales were completed during 1939 and 13 others are due to terminate in 1940. Hence the new sales approved will replace to some extent those which have expired and which will expire during the coming year.

Indian Sawmills

For many years sawmills on Indian reservations have furnished employment and building materials to the Indians. In a treaty of December 2, 1797, with the Oneida, Tuscarora, and Stockbridge Indians, residing in New York State, the United States agreed to erect a complete gristmill and sawmill to serve those nations and, if one convenient location could not be found, to erect two such sawmills. It was further agreed that the United States would provide, during 3 years after the mills were completed, one or more suitable persons to manage the mills, keep them in repair, instruct some of the young men of the three nations in the arts of miller and sawyer, and provide teams and utensils for carrying on the work of the mills. A treaty of September 29, 1817, with the Wyandot and six other tribes, provided for the erection of a sawmill and gristmill on the Wyandot Reservation, and the treaty of October 6, 1818, with the Miami contained a similar provision. Many subsequent treaties made like provisions for sawmills and gristmills and small sawmills were constructed on practically all reservations having forests suitable for saw timber. In subsequent years sawmills were provided under special appropriations or by special departmental action.

Most of the Indian sawmills constructed during the earlier periods were operated mainly to produce building materials for the Indians rather than as commercial enterprises. However, in two notable instances, namely, the Menominee Reservation sawmill at Neopit, Wis., and the Red Lake Reservation sawmill at Redby, Minn., commercial logging and milling operations were initiated for the purpose of furnishing the Indians with employment.

The Menominee Indian Mills were authorized by the act of March 28, 1908; a large double-band sawmill with an annual capacity of 20,000,000 board feet was established; the plant was destroyed by fire in 1925 but was rebuilt and has continued to operate through the years. The mills have produced a substantial profit since the beginning of operations and have provided the Menominee Indians with self-sustaining labor and the means of a healthful livelihood.

The Red Lake Indian sawmill was authorized by the Appropriation Act of June 5, 1924. This is a single-band sawmill with an

annual capacity of between 4,000,000 and 5,000,000 feet board measure. It furnishes the Red Lake Indians considerable employment each year and provides them with cheap building materials.

Several other sawmills operated by the Indian Service gave employment and training to a large number of Indians during 1939. Notable among these smaller units is the sawmill on the Navajo Indian Reservation. Production at this plant is still comparatively limited. However, profits have been reasonable, the operations of the unit have been effectively conducted, and the enterprise bids fair to assist the Navajo Indians materially in establishing themselves on a self-sustaining basis.

Fire Protection

Consistent with its declared policy of conservation covering the management of Indian forest and range resources, the Indian Service seeks a high degree of protection against the ravages of fire, insects, and disease. Fire still constitutes the principal problem on Indian lands, and although major forward steps have been taken toward its solution during recent years, losses continue to occur annually.

The protection organization of the Indian Service was reorganized during the year and revised regulations were issued in a handbook of fire control. This new set-up definitely fixes the responsibility of field officers and has materially increased the efficiency of the organization. Considerable improvement in the fire record has taken place as a result, and although 145,000 acres of forest and range land of the total 46,000,000 acres under protection was burned over during 1939, two-thirds of the area burned was confined to a single reservation, namely, the Warm Springs Reservation of Oregon which sustained a serious loss because a large number of fires caused by lightning occurred at one time. With the exception of this reservation, the fire record of the Indian Service for the year 1939 was outstanding, the damage comparatively reasonable and the cost of suppression low. The damage has been estimated at approximately \$100,000 and the cost of suppression at \$62,000, or a unit cost of controlling the area burned of 6.2 cents per acre.

INDIAN RANGE RESOURCES

The range lands in Indian ownership, including the forested area suitable for grazing, aggregate about 42,000,000 acres and constitute approximately 80 percent of the total Indian land resource. These

lands are distributed in varying amounts to some 90 reservations and 14 separate States, but the large proportion of the economically important grazing lands are confined to the western range country. Within the well-known livestock producing regions of these western range states, Indian range lands form an important part of the total national range resource and exert a considerable influence upon the livestock industry generally.

The importance of Indian grazing lands to the Indians in particular and to the livestock industry generally is revealed in the fact that a total of 988,194 Indian-owned sheep and goats, 262,630 Indian-owned beef cattle, and 124,719 Indian-owned horses and mules were grazed on Indian lands during the fiscal year 1939. A large number of livestock owned by whites also grazed on Indian lands. The use of Indian ranges by Indian livestock owners has increased materially during recent years and it is the aim of the Indian Service that all livestock grazed on Indian reservations will ultimately be in Indian ownership.

Considerable progress has been made in the conservation of Indian range resources during recent years, although much remains to be accomplished. The ranges have been placed under comparatively effective control, a large number of range improvements have been constructed, and the ranges are maintained in a reasonable state of production.

The Indian Service has always been faced with several difficult problems in connection with grazing management which are peculiar to Indian lands. Principal among these are the involvements arising out of the broken and uncertain status of Indian lands, the problem of wild horses, and the overgrazed condition of reservations in the Southwest.

A large part of the range lands on the reservations of North and South Dakota, Idaho, and to a lesser degree in the states farther west, were allotted in areas of 120 to 320 or more acres. Obviously, it is impossible for anyone, white or Indian, to engage in the livestock business on so small an area or even several times that amount. The result is that a number of Indian allotments, with probably some tribal lands, must be consolidated in order to make economic range units. This condition often prevents the Indians from utilizing effectively their ranges for their own livestock and demands a high degree of cooperation between all persons involved, if the ranges are to be placed under proper management.

Indian wild horses have always been a difficult problem by reason of their considerable numbers and the difficulty of exercising ade-

quate control over their use of the ranges. For many years the Indians were extremely reluctant to dispose of these worthless animals and inasmuch as most of the lands were unfenced, much damage was done to the ranges which they frequented. During recent years the Indians have consented to the sale of the unbranded horses and thousands have been disposed of. Although the problem is not as acute as formerly, much remains to be accomplished in this field before the Indian tradition, that wealth and position are measured by the number of horses owned, can be sufficiently adapted and modified so that the wildhorse pest can be wholly eliminated from Indian lands.

THE NAVAJO GRAZING PROBLEM

The grazing situation in the Navajo country of the Southwest has long been, and still is, critical. The Navajo, Hopi, and other Indian lands, amounting to over 18,000,000 acres in the aggregate, are extremely arid, have little rainfall, and are not only incapable of supporting a heavy growth of forage but are extremely susceptible to erosion. Here, because there is little opportunity for farming or other industrial development, the Indians have been forced to gain their livelihood through the raising of sheep, goats, horses, and cattle. The lands are too arid adequately to support the herds necessary to a reasonable standard of living for the large number of Indian people dependent thereon. As a result these lands have been heavily overstocked and overgrazed. Much study has been given to the problem by both the Indian Service and the Soil Conservation Service of the Department of Agriculture, and major forward steps have been taken in the improvement of conditions. The basic necessity is, of course, to reduce the livestock numbers to a sufficient point to permit the rehabilitation of the range—a fundamental requirement which has proven extremely difficult to place before the Indians in a manner fully understandable by them.

The steady purpose of the Indian Service has been to achieve both stock reduction and range management through consent and cooperation rather than through coercion. In the Pueblo area this purpose has been fully accomplished to the present date, and the handling, by Acoma and Laguna Pueblos especially, of their heavy and perplexing burdens has furnished an example to communities everywhere. On the Navajo, at every stage, the tribal council has moved with the Government in the program; but individual resistances presented themselves, important and stubborn enough to call for the invocation of legal authority. This authority has been fully supported by the Federal district court and has been useful in reinforcing

ing the community pressure and influence which the Navajo Council, and the Navajo leaders generally, have supplied.

A long-range and objective view cannot yet give perfect assurance that these essential ranges, and the human life dependent on them, will be saved because the battle to save them was started so late—years after erosion had reached the critical phase.

INDIAN ARTS AND CRAFTS

Indians, declare competent authorities, are craftsmen as good as the best among the artisans of Europe and Asia. Heretofore, they have lacked the opportunity to present their work to the right public. To make up for this lack, the Indian Arts and Crafts Board was established 3 years ago to promote the economic welfare of the Indians through the development of their arts and crafts and the expansion of the market for the products of their craftsmanship. Since the Board's inception, it has been diligent in its efforts to find wider markets for Indian products, to provide standards, and to interest the public in well made authentic products. The Board has worked with the producer for improvement of production, has established standards and government labels to protect the genuine, and has conducted exhibits, displays, and prepared publications for creating public appreciation of the beauty and usefulness of Indian art objects.

The Indian presentation at the Golden Gate International Exposition, San Francisco, gave the Board an opportunity to give a representative picture of the Indian civilizations of the United States and Alaska, to show both past and present achievements of these civilizations, and to open new vistas for their future.

In cooperation with a chartered Indian community of the Round Valley Reservation in California, a market for the arts and crafts products of various Indian tribal groups from all sections of the country was established as a part of the exhibit. This enterprise served as a Nation-wide advertising medium for Indian arts and crafts and created a better understanding of and a wider market for Indian products; it served as a stimulus for arts and crafts production and presented a testing ground for the commercial value of various products from different parts of the country. The increase in sales on the market from the opening of the Fair to the end of the fiscal year indicates the importance of careful presentation of Indian products in creating a demand even in cities where Indian goods are not well known.

Less extensive exhibits were those at the Intertribal Indian Ceremonial, Gallup, N. Mex., in August, and at the Indian Exposition, Tulsa, Okla., in October 1938.

A mark of genuineness to distinguish all hand-made Alaskan Indian and Eskimo work from imitations made abroad and in the United States proper has been created by the Board. Marks of genuineness and quality have previously been established for Navajo, Pueblo, and Hopi silver; and certificates of genuineness for Navajo all-wool woven fabrics.

The Choctaw spinning project in eastern Oklahoma has been reorganized to effect more efficient production and increase the earnings of the individual spinners. This project, initiated the previous year, now has 78 spinners.

Intensive development work has been carried on in Oklahoma, in the Sioux area, and in southern Arizona; and, in cooperation with private persons, among the Coeur d'Alene Indians, at De Smet, Idaho. Markets for the production stimulated by these activities have been provided through the Indian market at the San Francisco Exposition. On many reservations, preparations for the market in San Francisco have increased the sale of products locally. The reputation of the exhibit, too, has proved beneficial in many places for the sale of Indian goods, as several business enterprises who previously had not carried Indian goods have now included them in stock and others plan to do so next year.

Plans are under way for revision of the preliminary edition of a bibliography of articles and papers on North American Indian art, issued last year, and for the printing of a final edition with provision for issuance of supplements from time to time to keep the publication up to date.

A book on the arts and crafts of the North American Indian, sponsored by the Board, has been prepared by the American Museum of Natural History, under a grant from the General Education Board.

The demand for a small publication, giving a survey of Indian cultures in the United States and Alaska, with special emphasis on artistic production, has led to the preparation of a booklet, based on material taken from the Indian exhibit at the San Francisco Fair.

While it is not anticipated that increased arts and crafts production will by itself ever solve the entire economic problem for the Indians, it will, however, enable many of them to become self-supporting through their craft work, and will supplement the income of a still larger number. According to an income survey made by the Indian Service for the calendar year 1938, the average income from arts and crafts aggregated only about 21 $\frac{1}{6}$ percent of the total income earned by Indians. A total income of \$863,267 from arts and crafts production, as revealed by the survey, is distributed among the various crafts, as follows: blankets and rugs, \$467,873; silver

work and jewelry, \$108,718; bead and leather work, \$143,618; basketry, \$60,291; pottery, \$25,928; woodwork, \$14,496; other crafts, including clothing and household articles, dolls, drums, and other miscellaneous items, \$42,343.

SERVICES TO FAMILY, COMMUNITY, AND CULTURAL LIFE

Indian Service policies, funds, and personnel focus in the ultimate upon the family, and community life of the Indians. To improve their standards of living, to combat sickness and disease, to provide cultural expression, to increase the social satisfactions of home and community life, these are the fundamental objectives of the Indian Service. Basic, of course, is the program of economic rehabilitation paralleling that of conserving and making efficient use of natural resources. Closely related to these are the community services of hospitals and nursing, education, development of arts and crafts, and the enforcement of law and order.

HEALTH

The death rate of Indians has fallen steadily during the past years. In 1931 there were 16.0 deaths per thousand, in 1938 the rate was 14.9, and for the year 1939 the rate fell to 13 per thousand.

The birth rate has fallen also, but in no such proportion. In 1931 the birth rate (live births) was 21.5 per thousand, in 1938, 22.9, and in 1939, 22.7 per thousand. This gives an increase for Indians of births over deaths of 9.7 for the last year which is an increase of 1.7 over the previous year.

The general disease rate has been about the same as in preceding years, with some few exceptions. There has been a marked increase in the incidence of influenza, measles, and mumps. While records show that malaria also has increased this is probably due primarily to intensive surveys which are bringing to light more cases. In spite of the fact that 1,576 more Indians were vaccinated against smallpox than during the preceding year, the number of cases reported for this year was 60, as compared with 48 for the year before. This indicates that a universal vaccination program against smallpox must always be an important part of any health program on the reservations.

The Indian Medical Service continues to make progress in its fight against trachoma, the eye disease so prevalent among Indians. Formerly operations were resorted to, 2,587 of them being performed in 1929. This year only 92 trachoma patients were operated on. Experimentation with sulfanilamide therapy, the beginning of which

was reported last year, has gone on intensively in a few centers, and results have exceeded the most optimistic expectations. At 11 of these centers, 959 started treatment; 901 completed it. After an average of about three weeks' treatment, 460 cases, or 51 percent, have been reported as arrested, and after more continued treatment an additional 432, or 47.8 percent, showed improvement. Another series of cases were studied at the Trachoma School, Fort Apache, Ariz. At this school during the past fiscal year, 167 were given sulfanilamide treatment for 21 days. After 30 days' observation, 125, or 75 percent, were reported arrested, while 42 others showed improvement and became arrested after an additional three weeks' treatment.

Trachoma research continued through the year at Fort Apache under the general direction of Dr. Phillips Thygeson, but the center was closed June 30, 1939, having completed a remarkable program of research for the benefit, not only of the Indians, but for all mankind.

Tuberculosis.—In the tuberculosis field, emphasis this year was placed on health education, especially in connection with surveys. An outstanding survey is now in progress at the Pine Ridge Reservation, where from July 1937 to June 1939, 5,251 X-rays were taken covering perhaps half of the 8,000 Indians of the reservation. Intensive tuberculosis surveys are also in progress at the Rosebud Reservation and among all of the Indians of Wisconsin. This latter program is with the help and cooperation of the State Board of Health.

The Phipps Institute, continues to give the Service valuable help and advice in the training of personnel, the interpretation of X-rays, and in the B. C. G. or vaccination program. During the year it was reported that 1,565 had been vaccinated and 1,460 had been observed as controls. Since this work started, there was only one death from tuberculosis among the vaccinated group and 17 among the control group, an obvious difference in favor of the vaccinated group. Deaths from causes other than tuberculosis were reported as about equal.

A tuberculosis institute was conducted at Shawnee, Oklahoma, during the spring of 1939 by Dr. H. W. Hetherington and Miss Fannie Eshleman, of the Phipps Institute. About 80 doctors and nurses from the Oklahoma area attended.

Hospitals.—New hospitals were opened during the year at Tahlequah, Okla., with 75 beds, and at Talihina, Okla., with 150 tuberculosis beds, and 75 beds for general cases. There are now 80 general hospitals with 3,053 beds and 14 tuberculosis sanatoria with 1,494 beds.

The general hospitals treated 55,460 patients during the year, including 2,143 tuberculosis cases, at a cost of \$3.31 a day.

The 14 tuberculosis sanatoria treated 4,192 cases of which 2,195 were tuberculosis cases and 1,997 other than tuberculosis. This larger number of general cases is influenced by the large number treated at the Talihina Sanatorium and the Tacoma Sanatorium, both of which do a large general service.

Dental.—Dental treatment was given to 26,508 patients by full-time dentists and to 6,741 patients by part-time dentists and 69,466 treatments were given. A new position has been created of dentist in charge of dental hygiene education for special work in the oral hygiene phase of dental care. This service was started just at the close of the year and no data are yet available.

Public Health nursing.—Indian Service nurses in the United States made 90,000 home visits during the year and interviewed or treated an additional 30,000 people in their offices. The nurses also assisted at various clinics to which some 60,000 people came.

Experience center for Public Health nurses.—In an effort to get sufficient public-health nurses to fill our vacancies, a new Civil Service position was established, namely junior public-health nurse. There is no experience prerequisite for this position but nurses are assigned to an experience center within the Indian Service. This center comprises 10 field positions in the Five Tribes area and 5 in Kiowa.

Nurses work in this area for 6 months under close supervision, after which they are sent to fill the existing vacancies throughout the Service and will work under less close supervision.

Cooperative relations.—Close affiliations with State and local boards of health were maintained and strengthened. The cooperative health work in operation at the beginning of this fiscal year was satisfactorily maintained and in addition, agreements were made with the State Board of Health of Utah for the placing on duty of a full-time field nurse for a widely scattered area along the Nevada-Utah line. The salary of this nurse is shared equally by the State and the Indian Office.

Attention has been focused through the venereal disease legislation on more aggressive programs by State boards of health in venereal disease control among Indians. State health officers have been personally interviewed and certain agreements received as to just what the States could do. Their replies have been most gratifying.

Sanitary Engineering.—The Public Health Service through its engineer corps, made possible a sanitary engineering service which has been in effect now in the Indian Service for some years. One hundred agencies and Indian institutions were visited and surveyed.

Sixty-four reports on surveys were submitted, 64 conferences attended, 8 water-treatment plans prepared, 12 sewage-treatment plans prepared, and 74 Indian Service sanitary plans reviewed.

Personnel.—The personnel at the close of the fiscal year included 10 administrative and supervisory physicians, a supervising dentist, 8 supervisory nurses, 162 whole-time and 99 part-time field physicians, a special expert in tuberculosis, 4 special physicians for tuberculosis, 12 special physicians for trachoma, 25 consultants, 17 whole-time and 11 part-time dentists, 114 field nurses, 458 hospital nurses, 16 nurses at large working with special physicians, 10 assistant medical technicians, and over 900 other employees, a total of about 1,950. This is an increase of about 100 over the preceding fiscal year.

An associate consultant in hospital nursing has been added to the administrative staff, a field nurse supervisor is to be in charge of the experience center for public health nurses stationed in Oklahoma, and an assistant supervisor has also been assigned to the experience center.

ALASKA

The medical care of the 30,000 natives of Alaska, the prevention of disease among them, and the extension of public-health practices in their communities has been the responsibility of the Indian Service since 1912. The work is administered by a medical director, a supervisor of nurses, and a dental supervisor, all of whom make periodic visits to the field.

Facilities maintained for this purpose include 7 hospitals, each with a physician, and an aggregate of 26 nurses and 52 other employees. A field staff of 30 nurses carry on public-health nursing activities and initiate emergency measures for medical relief in the absence of physicians, and 4 physicians devote full time to medical services for these people. Other facilities utilized are 12 private hospitals, including 1 outside of the Territory, which care for patients on a contract basis; 2 Government-owned hospitals within the Territory, and 2 Indian Service hospitals in the States. Indian Service hospitals admitted 1,440 patients for a total of 48,601 days of care during the year.

A traveling physician, appointed during the year, visited 7 localities, providing medical attention for 1,993 people who formerly had not had access to this service.

Several additional field nurses were appointed during the year, extending considerably the service to villages in more isolated sections, particularly in the Yukon and Kuskokwim River areas. Field nurs-

ing activities were extended to two localities—the Bristol Bay area and the Cook Inlet region, where services previously had not existed. A field nurse was assigned to travel on the *North Star* and, under a cooperative agreement with the Territory, full-time nursing services are provided at Wrangell and Petersburg, subsidized in part by the Office of Indian Affairs. Public-health nurses visited new localities, reaching 4,979 people not provided for previously.

The tuberculosis problem persists and the need for additional hospital facilities is becoming acute. Field nurses are teaching the isolation of patients and the segregation of the tuberculous in homes apart from children and those not infected with the disease, but this can be only a temporary measure in the total program of tuberculosis control. Another emphasis in the field-nursing program is on maternal and child care. In many instances nurses hold classes in midwifery for the native women. Two vocational schools maintained by the Office of Indian Affairs are stressing both tuberculosis control and child care in their health-education programs, and providing carefully planned programs which include bed rest when indicated for certain students suffering various handicaps, including tuberculosis in noninfectious stages.

Cooperation has been extended to the Territorial Department of Health in its program of tuberculin testing and X-ray survey, and this service is of inestimable value in indicating areas for special projects. In certain villages in southeastern Alaska a program of B. C. G. vaccinations for control of tuberculosis was started in the fall of 1937 and has been followed through during the present year. Five hundred and twelve have been vaccinated and 466 studied as controls. Only 2 cases of tuberculosis have developed among the vaccinated group, while 10 have developed among the controls.

During the summer of 1938 a study was undertaken to ascertain the cause of the frequent outbreaks of meningitis on the lower Kuskokwim. The Territorial Department of Health cooperated in this investigation.

Diphtheria appeared at Matlakatla, but the Indian Service physician, with the assistance of a laboratory technician sent down from the Territorial Department of Health, controlled it promptly. There were only 9 cases and no deaths. There was a whooping-cough epidemic of much severity in the lower Kuskokwim region, resulting in approximately 40 deaths among young children. Whooping cough was also prevalent in many other areas, but at no other place was it reported to be very severe. Influenza was unusually prevalent throughout the Territory, but was reported to be severe only among the natives

in the Cook Inlet region. At Tyonek there were several deaths among small children. A few mild cases of scarlet fever were reported at Mountain Village and other points on the lower Yukon. It was also reported at Wales. Late in the spring there was a considerable epidemic of measles at Eklutna but the cases were not severe. There was one case of typhoid fever at Saxman.

Dental care is provided by a plan under which local dentists administer to needs of natives in their respective localities. These dentists frequently visit villages tributary to their headquarters, thereby serving a large number of natives. A dental supervisor visits areas not otherwise reached by the profession. Provisions for more adequate dental service to natives in the vicinity of Juneau was made by the installation of a complete and up-to-date dental unit at the Government hospital.

The study of dental conditions on the lower Kuskokwim which has been carried on over a period of several years by Drs. L. M. Waugh and Donald Waugh, of Columbia University, was continued into the first part of the present year.

The United States Coast Guard cutters continued to render valuable assistance to natives of Alaska in localities where medical service is not otherwise available, and provided transportation of patients in many localities where other means are lacking, particularly in the Aleutian Islands.

Transportation.—One of the most serious problems continues to be the difficulty of transporting patients from outlying villages to the hospitals. Principal dependence has to be placed on airplanes, which of course, are very expensive, but in the interior there is practically no other means of travel in the summer, although dog teams are much used in the winter. Even on the coast and on the rivers, boats are infrequent, and in the winter cannot be used at all except in the south. On numerous occasions the Coast Guard has been called on to transport emergency patients and has responded willingly whenever possible. Their physicians and dentists have treated patients in all villages which they have visited, and on numerous occasions vessels have made special trips and remained at villages for several days while the medical officers worked among the natives.

The cooperation between the Territorial Department of Health and the Alaska Medical Service has continued and increased through the year. In all public-health activities the two organizations are working closely together, although the Health Department takes no part in the medical relief which forms so large a proportion of the Indian Service work.

EDUCATION

During the fiscal year, the 4-year-old in-service training program of the Education Division began to bear fruit. A clearer understanding was gained of the unique educational problem presented by our Indian pupils who, alien to our culture and handicapped by lack of knowledge of the language, have had difficulty in understanding their white associates despite contact between the races for more than 200 years.

The Indian Service in all its divisions is forced to depend in large measure upon the average white citizenry in recruiting new personnel for its work. Teachers drawn from the average American teachers college or university are usually unfamiliar with the peculiar cultural background of Indians and in large measure they have been trained for service in urban areas. Seldom do they understand the manifold problems of a rural population primarily dependent upon wise land utilization for its economic self-sufficiency. To repair this deficiency the Indian Service undertook, in the summer of 1936, to organize a series of summer schools in Indian residential schools adjacent to or part of reservations where the program of instruction could be closely integrated with a study of the economic and social problems existing within the reservation. Instruction was offered in anthropology, various studies of land utilization, soil conservation, and other factors of importance leading to economic self-sufficiency. Studies in educational technique, work in presentation of English to non-English-speaking students, instruction in arts and crafts of the several native groups, were supplemented by seminars in a variety of other problems dealing with the work of student advisers, matrons, steam power plant engineers, and maintenance men. Instruction in health education was given, with demonstration work in the control and treatment of trachoma with a view to providing increased cooperation in the continuing treatment of this disease through the day schools as well as the boarding schools.

Two schools were held during the summer of 1936, one at Pine Ridge, S. Dak., the other at Wingate, N. Mex. The following summer four schools were held, adding Chilocco and Sequoyah, Okla., to the two operated the preceding summer.

The third summer (1938) schools were held at Sherman Institute in California and Chemawa, Oreg. Special emphasis in the Chemawa program was placed upon the problems of Alaska, and some employees of the Alaska Service enrolled.

At Sherman Institute particular emphasis was placed upon a program of courses introducing new employees to the problems of the Indian Service.

During 1939 summer schools were returned to Pine Ridge and Wingate.

In addition to the summer-school work outlined above, further work in in-service training was offered in the fall of 1936 by the inauguration of a field letter by the Education Division addressed individually to all employees. This field letter presented matters of educational policy, methods of instruction, discussed reasons for reviving Indian arts and crafts, reviewed problems in Indian health, emphasized the importance of safety measures as a general policy throughout the service, and in many other ways carried on a fortnightly presentation of measures deemed helpful in the promotion of greater understanding of needs of specific reservations and individual Indians.

During the same period of time the Education Division has been increasing the unity between its own program and that of other divisions of the Service. Community day school teachers throughout the Indian Service have cooperated closely with the Extension Division in carrying on programs of community activity. Hundreds of community gardens organized and developed by the teachers and school children have encouraged cooperation by the adult group in the community to make extension services more productive. The Education Division has also cooperated with the Medical Division in its attack on trachoma by the operation of special trachoma boarding schools at Fort Apache and on the Navajo reservation. Teachers and housekeepers in Indian day schools have worked with the doctors and field nurses in the administration of daily treatments for the control of trachoma among the day-school population. The Division has cooperated with the Medical Division in the operation of instructional units in the tuberculosis sanatoria. The transportation services of the Education Division have been made available to the Medical Division on several reservations.

An increasing program of adult education has been growing up primarily through the work of the community day schools. In some areas this takes the form of classes in English, for older Indians, in others of civic discussions related to the new functions growing out of new tribal powers made possible by the Indian Organization Act. Short courses dealing with improved methods of agriculture, irrigation work, and handling of livestock have been held in conjunction with several of the reservation boarding schools.

Cooperation between the Education Division and the Indian Arts and Crafts Board has been continually increasing, and Indian high schools are emphasizing production training in many of the crafts which offer prospect of economic advantage to the Indian. Repre-

representatives of the schools and the Arts and Crafts Board encourage these trained craftsmen and women to maintain their skills after leaving school by facilitating the marketing of their products. This collaboration between the two divisions in Alaska has resulted in substantial increases in cash returns to the natives. The income from arts and crafts to these peoples now approximates \$100,000 a year. At present the major points of cooperative activity are among the Five Tribes in eastern Oklahoma where a hand spinning and weaving project is being sponsored jointly; in the Pine Ridge, S. Dak., area where a revival of quill and bead work is making progress; in the Papago area where the quality of basketry is being improved, and throughout the Navajo area where the quality of blankets and of silver jewelry have both shown distinct improvements.

The Education Division is working with the Irrigation Division to develop plans for land colonization on the Pima Reservation and the Colorado River reservation where large blocks of Indian-owned land are being placed under irrigation.

Representatives of the Education Division are experimenting in the use of native materials for home improvement. At the Pine Ridge reservation in South Dakota a great deal of progress has been made in the adaptation of rammed earth to such a use. Experimentation with rammed earth blocks has been carried on at Pine Ridge in South Dakota and on the Navajo Reservation.

Experimentation is also being carried on in the use of improved adobe construction in the Southwest, and the Education Division is collaborating with the rehabilitation program in the production of low-cost housing.

Much emphasis has been placed upon improved safety practices throughout the Indian Service. The Education Division has undertaken the training of automobile drivers, is training and licensing bus drivers, and has provided a series of tests worked out in collaboration with the American Automobile Association for the issuance of an Indian Service driver's license to be required of all persons operating Government automotive equipment. The safety program is being extended to the inspection of shops, buildings, roads, and other areas where safety practices are of importance.

SPECIAL EDUCATIONAL ACTIVITIES

In order to suit the program of Indian secondary schools to the vocational opportunities of the various areas, a continuing vocational survey was inaugurated in 1938. This included an exhaustive study of the conditions on the Pine Ridge and Rosebud Reservations and the success with which high-school graduates from these schools

found employment. A survey has been further extended to graduates of Sherman Institute in California and graduates of the Phoenix Indian School in Arizona. The Phoenix study also included an examination of the vocational program of the reservation high schools on the several Arizona reservations. These studies have resulted in a replanning of the school curriculum in the specific areas studied.

Under authority contained in the Appropriation Act of 1939, permitting the Education Division to publish experimental text materials for use in Indian schools, the preparation of a variety of useful materials has been begun. This includes a pamphlet series on the cultural background of various prominent Indian tribes, another pamphlet series discussing methods in Indian arts and crafts, a series of Indian life readers published in both English and in some cases the native Indian tongue; lastly, a series of miscellaneous publications covering materials on soil conservation, Indian cooperatives, etc. These publications are being prepared by employees of the Indian Service, are being illustrated in large part by Indian artists, and published in Indian school print shops.

During 1939 the Indian Service received a small grant of money from the Carnegie Corporation for experimental work in mural and fresco art. This sum was used to employ the services of Mr. Olof Nordmark, one of the foremost authorities in wall-painting techniques in the United States. Mr. Nordmark spent about a year stimulating mural work at the Riverside and Fort Sill schools in Oklahoma, at Phoenix Indian School in Arizona, and will devote some time to similar work at Pine Ridge, S. Dak. Several of the students who have worked with Mr. Nordmark have received contracts for the mural decoration of Federal buildings. Their own work during instruction periods has resulted in the beautification of school, gymnasium, and dormitory structures at the institutions where classes have been held.

LAW AND ORDER

The great majority of Indians in the United States are law abiding. Indian offenses are usually minor ones. Organized crime, gangsterism, and other evidences of professional crime are almost unknown. Drunkenness is perhaps the most frequent predisposing factor toward criminal activities.

Several factors tend to create problems of law and order among Indians. In the first place, especially in the allotted areas, the coming of the white man and white concepts have tended to destroy the native social organization and to break down the disciplines and social controls which were inherent in this community organization.

In the second place, many groups have suffered from a serious dislocation or complete destruction of their native economy. In an archaic culture the economy is usually a central factor about which religion, morals, and other aspects of behavior revolve. The destruction, therefore, of the native economy has removed the very core of social organization with its controls and disciplines. In the third place, many Indian groups have been reduced to economic dependency by events of the past generation, and perhaps in order to maintain their own self-esteem have resorted to drinking and other forms of escape which immediately bring about a problem of law and order. Finally, the Indians are affected by the tendency of the general public toward lawlessness.

These basic causes are further complicated by legal machinery stemming from the concept of Federal guardianship over Indians which exempts Indians living within reservations from most of the laws and law-enforcement machinery of the States and localities in which they live, and which creates confusion with regard to the jurisdiction of the several courts.

Improvements in the administration of law and order will have to take into account these basic economic and psychological causes, but this will not be enough. There must also be a strengthening of the actual machinery for enforcement.

Rather generally, State courts have declared they are without jurisdiction over offenses committed by Indians on Indian reservations, it having been held in numerous cases that an Indian tribe is a distinct political society responsible for the management of its own affairs and its own government. When an offense is committed on land that is not Government land, nor within the boundaries of a reservation, the State most certainly has power to punish. Such jurisdiction has never been denied by Federal statute. When the crime is committed on a reservation, however, the question of jurisdiction is not always clear.

The situation resolves itself to this: The United States courts have jurisdiction only with respect to 10 major crimes which have been specifically designated by Congress. The State courts have jurisdiction only with respect to crimes committed off reservations. All other crimes and misdemeanors, if punishable at all, are under the jurisdiction of special courts of Indian offenses which have been established in a large number of reservations. They follow either the code promulgated by the Secretary of the Interior or ones which have been devised by their own tribal councils acting under authority of their own constitutions adopted under provisions of the Indian Reorganization Act of 1934. An opinion of the Solicitor for the

Department, dated April 27, 1939, greatly strengthens the position and authority of the Indian courts in dealing with matters pertaining to Indian reservations.

These special courts of Indian offenses function rather satisfactorily in closed reservations, but in only a few of the broken or allotted areas have they proved effective. These courts seem to depend for their effectiveness upon the extent to which the social organization and social disciplines within the tribe remain intact. In the broken areas the State courts have occasionally assumed jurisdiction over restricted Indians, but generally they have withdrawn immediately when the jurisdiction has been challenged. These jurisdictional difficulties undoubtedly result in many misdemeanors going unpunished because of the absence of any duly constituted authority of law and order.

There is no single solution to this problem. The same solution may not work satisfactorily throughout a single State. Some groups might with profit be made subject to State laws and treated in the same manner as the white citizens of the State with whom they are interspersed. Others, however, who live within a compact, closely knit, closed reservation are in a much better position to administer effectively a program of law and order, through their own court of Indian offenses and their own Indian police.

In the Southwest, many groups would be placed at a distinct disadvantage if made subject to the laws of the State and the jurisdiction of the State courts. Most of these groups administer their own sensible laws with a temperateness and effectiveness not always found in white communities. On the negative side, it is doubtful if they would be treated justly before the local white courts—not that there is discrimination on the part of the courts, but the Indians themselves simply are not accustomed to the procedures of our white courts and have a concept of law enforcement wholly at variance with those of our white culture.

In many cases it would be impossible for State courts to attempt to exercise jurisdiction. In many of the isolated reservations there is no organized county government nor any other instrument of State, county, or municipal government within easy reach of the Indian communities. The expense of establishing instrumentalities of State law enforcement within these communities would be prohibitive.

In the State of California, however, the Indians are interspersed with the whites throughout the State with the exception of one small reservation in the northern part. They live either in small groups on rancherias, or as individual farmers on allotments in the

midst of white farmers, or as migratory agricultural workers. There are strong arguments for placing these Indians, so far as their relationship to law is concerned, on the same basis as the whites of the State. Similar situations prevail in several other States.

What is the attitude of the Indians themselves? The tribal councils of several reservations have gone on record as favoring the turning over of the entire administration of law and order to the State, with the Federal Government bearing a portion of the additional expense to which the State would be put. As opposed to that, the Indians of another State have openly declared they will resist any effort to make them subject to State laws, that they recognize only the jurisdiction of the Federal Government.

It should not be understood that a simple change in the legislation of Congress, placing the Indian population under State jurisdiction, or the placing of some and the exemption of others, or any other procedural device will solve the problem of vice and crime, and delinquency among Indians. The causes of crime are to be found in the economic and social lives of the offenders. In the long run, the ability of the Indians, aided by intelligent guidance, to work out an adjustment to the demands of a constantly impinging alien culture and to develop social and economic self-sufficiency, will determine the extent to which they will become or remain law abiding and productive citizens.

BUILDING CONSTRUCTION

The construction work carried on at many of the Indian Service schools and agencies since the beginning of the first Public Works program in 1933 has provided employment for a large number of Indians, and, at the same time, has resulted in much needed improvements in the housing, hospital, school, and other facilities.

In the prosecution of the building program, special effort has been made to anticipate the future needs of the Service and, to that end, plot plans have been prepared for many of the jurisdictions showing the proposed ultimate development of the plants.

The 1939 appropriation for construction and repairs of buildings and utilities in the Indian Service, including the 1938 deficiency appropriation, was \$2,061,000. In addition to this, there was allocated \$2,998,000 from the appropriation for the construction of public works (act of 1938).

The following tabulation gives the number and types of projects undertaken with funds provided under the 1938 Public Works program and the 1939 Interior Department Appropriation Act:

	1938, P.W.A.	1939, regular		1938, P.W.A.	1939, regular
School buildings.....	31	6	Horse barns.....		2
Remodeling schools.....	3		Shop buildings.....		1
Dormitories.....	5	4	Warehouses.....	1	1
Remodeling hospitals.....	1	4	Community building.....	1	
Nurses' quarters.....	3	7	Agricultural building.....		1
Employees' buildings.....	14	5	Central heating plants.....		2
Remodeling employees' build- ings.....	1		Repairs to heating plants.....	8	7
Cottages.....	22	21	Improvements to heating dis- tribution lines.....	7	7
General repairs.....	3	8	Improvements to sewer lines.....	12	11
Office buildings.....	3	2	Improvements to electric lines.....	10	8
Remodeling office buildings.....	1	3	Improvements to water devel- opment.....	13	13
Infirmaries or dispensary.....	6	1			
Elevator installations.....		1	Total.....	148	119
Jails.....	3	3			
Dairy barns.....		1			

At the close of the fiscal year, June 30, 1939, the Indian Service Public Works projects had been substantially completed. Thirty-six projects, totaling \$1,877,800, were under construction by general contract, and 42 projects, totaling \$1,120,200, by force account.

Of the projects authorized in the 1939 Appropriation Act, practically all are now under contract or have been authorized for force account procedure. Twenty-three projects, representing a total value of \$815,500, will be constructed by general contract, and 52 projects, representing a total value of \$1,041,500, by force account. Of the 1939 appropriation, \$250,000 is allocated for work in Alaska. Of this sum, \$160,000 will provide health facilities including a hospital at Kakanak, dispensary and quarters at Tetlin, and a dispensary at Hydaburg. The remaining \$90,000 allocated for construction work in Alaska is for school projects.

Field-construction offices are maintained at Albuquerque, N. Mex.; Billings, Mont.; Muskogee, Okla.; and Juneau, Alaska.

TRIBAL CLAIMS AGAINST THE UNITED STATES

Indian tribal claims.—Legislation making possible the equitable, reasonably prompt, and morally as well as legally final, settlement of Indian tribal claims, has not been enacted, although conferences between the Departments of Interior and Justice resulted in substantial agreement upon the text of a bill designed to this end.

The continuing system, affecting Indian tribal claims, is wasteful of government money, deplorable in its effect upon the morale of numerous tribes, and fundamentally, glaringly unjust.

Klamath et al. Tribes.—On April 25, 1938, the Klamath and Modoc Tribes and the Yahooskin Band of Snake Indians obtained a final judgment against the United States amounting to \$5,313,347.32, with interest, as a result of the taking by the United States of 87,000 acres of land without adequate compensation.

The funds in satisfaction of the judgment were appropriated by the act of June 25, 1938, and were authorized to be distributed by the act of August 7, 1939. Under the provisions of the latter act, each enrolled member of the tribes will receive \$2,000. Of this amount, each adult will be paid immediately \$100 for his unrestricted use, while a like sum will be placed in the individual Indian money account of each minor and incompetent adult Indian for expenditure under the general individual Indian money regulations. The remaining \$1,900 of the share of each adult and \$1,400 of the share of each minor will be placed to their credit for expenditure under rules and regulations prescribed by the Secretary of the Interior for the purchase of land, erection and improvement of homes, industrial purposes, education, etc. The remaining \$500 of the share of each minor is to be retained in the Treasury until he becomes an adult as defined in the act.

After the segregation outlined above has been made, \$300,000 are to be transferred and added to the loan fund of the tribes; \$375,000, or so much thereof as may be necessary, are to be used to pay immediately certain adult unallotted Indians \$1,500 each in lieu of allotments of land, and the remainder of the principal is to be transferred to and become a part of the capital reserve fund of the tribes which was created by section 1 of the act of August 28, 1937.

Shoshone Tribe.—The judgment of the Shoshone Tribe of the Wind River Reservation—\$4,408,444.23, with interest—also became final on April 25, 1938. This judgment was awarded because the United States had taken half of the Shoshone or Wind River Reservation and had placed the Northern Arapaho Tribe on that reservation without the consent of the Shoshone Tribe as required by the treaty under which the reservation was established.

The funds in satisfaction of the Shoshone judgment were appropriated by the Congress on June 25, 1938, and authority to distribute them was granted on July 27, 1939. This provides that each enrolled living member of the tribe shall receive \$2,450. Of this sum, each competent adult shall receive \$100 immediately. A like sum shall be deposited in the account of each minor and incompetent adult Indian for expenditure under the general individual Indian money regulations. The expenditure of the sum of \$1,350 of the share of each adult and the sum of \$500 of the share of each minor is restricted to the purchase and improvement of lands, erection and improvement of homes, industrial purposes, education, etc. The remaining \$1,000 of the share of each adult is to be available for expenditure under rules and regulations to be prescribed by the Secretary of the Interior and the remainder of the share of each

minor amounting to \$1,850 is to be retained in the Treasury until he becomes an adult as defined in the act.

The act of July 27, 1939, also authorizes the expenditure of not to exceed \$1,000,000, upon the request of the Shoshone Tribe and with the approval of the Secretary of the Interior, for the purchase of lands. In addition, \$125,000, at the request of the tribe and with the approval of the Secretary of the Interior, is to be set aside as a loan fund for making loans to individual members, or groups of members, of the tribe. The remainder of the judgment fund is to be available for appropriation with the consent of the tribe for purposes of benefit to the tribe, including the establishment and administration of productive enterprises, the income therefrom to be credited to the Shoshone tribal judgment fund.

THE SERVICE OF INFORMATION

On probably no subject in the history of the United States has there persisted a more dramatic and more flagrant atmosphere of error than on matters surrounding the American Indian and his affairs. From the heroic distortions of the James Fenimore Cooper school of fiction to the fantastic sensationalism of some modern movies; from the early exploitation of land-hungry Europeans to present-day petty racketeering, the history of white-Indian relations has been a history of inaccuracy or ignorance, relieved occasionally by rare and refreshing streams of factual illumination.

One of the important aims of present-day Indian Administration has been to intensify, to amplify, and to spread this hitherto feeble light of fact. The public is beginning to learn that fact is more interesting than fiction; that the unvarnished truth about Indians and Indian affairs is more absorbing than misconception.

Correcting traditional misconceptions has been only a small part of the Indian Service informational problem.

To explain and interpret the new policies to the Indian Service personnel, to the Indians and to the many thousands of non-Indians who are intensely interested in Indian matters, has become a problem of major importance.

Further to facilitate the spread of current and historical information both from published and official material, these among many other things are being done:

Under the direction of the information officer the facilities of the Indian Service library are being thoroughly and methodically revamped with a view to making quickly available the many-sided material contained in the rich reservoir of the Indian's past and present life. In recent years the demand for this material has in-

creased to the point where thousands and thousands of inquiries pour in each year from every corner of the United States and from many foreign countries.

Innumerable bulletins dealing with various phases of Indian life have become obsolete and are being replaced by timely and attractive publications of convenient size and in numbers somewhere near commensurate to the demand.

Another major task of the Information Office has been the analysis of all material currently published on Indians and Indian matters. Between January 1 and June 1, 1939, 28 books on Indian subjects were published and 47 leading periodicals carried articles on Indians and Eskimos.

An outstanding example of the dramatic focusing of public attention on Indian matters is furnished by the Indian exhibit at the Golden Gate International Exposition in San Francisco. The response to this presentation has been so overwhelming as to precipitate great demands for information of many types and in many fields.

To a lesser extent this is also true of the many Indian presentations offered at fairs and elsewhere throughout the country.

The persistent effort has been to make immediately available to all persons in this country and the many foreign countries from which requests pour in, full, factual, and interesting information on current and historical Indian matters. Among the principal beneficiaries are: Schools and colleges, Members of Congress, periodicals and newspapers, church and club groups, museums and libraries, historical associations, other Government departments, and the Indian Service personnel itself.

The entire emphasis has been placed on meeting needs for information which are manifested in a variety of ways and which have never before been so multitudinous.

COOPERATION

The Indian Service has obtained from agencies of government, National, State, and local, a vast range of technical and human skills, services, and intimate knowledge such as could not in years have been acquired by the Service acting alone.

These cooperative liaisons are being developed not only with Federal agencies, but with numerous State and local groups in many parts of the country.

Some examples of these cooperative activities are as follows:

The Farm Security Administration has granted a number of loans to Indians, has aided in drought relief, and allocated a substantial sum to the Indian Service for general rehabilitation work.

The Soil Conservation Service has proved of tremendous aid to the conservation program of the Indian Service. The T. C.-B. I. A. (Technical Cooperation, Bureau of Indian Affairs) unit has continued to conduct human dependency surveys, studies of range management, soil classifications, and other conservation surveys. Conservation agreements have been entered into between the Indian Service and the Soil Conservation Service covering long-range programs on a number of reservations.

The work of the Civilian Conservation Corps constitutes one of the really important contributions to Indians made by other governmental agencies.

The National Youth Administration has approved participation of Indian youth in its student-aid program. Six dollars a month may be allowed students attending Indian schools to assist in providing clothing, school supplies, and lunches. This program includes not only Indian students in public schools, but those attending Federal schools as well.

Progress in the field of social security for Indians has been steady and gratifying. The number of Indians benefiting from Social Security assistance has nearly doubled during the past year—an increase from 6,451 Indian recipients in October 1937 to 11,162 in November 1938, with a continuing increase since that time. It is estimated that more than two-thirds of the Indians eligible for such assistance are now receiving it. A study of the amounts granted to Indians indicates that the average monthly grant to them is lower in most States than the average grant for the State as a whole. This can be partly accounted for by certain free services available to Indians.

In the field of child welfare we have continued to provide for certain Indian children through contract with the Michigan Children's Aid Society and the Wisconsin State Board of Control. In California, especially in the Sacramento Agency, foster home care for dependent children is obtained through contracts with the various counties which share the cost in some instances and provide the needed services. In North Dakota a contract has been in effect for 2 years whereby the State and the Indian Office share the cost of a child-welfare worker in the Fort Totten Reservation. This experiment was so successful that the State offered to share the cost of another child-welfare worker, who was then placed at Turtle Mountain July 1, 1939. Both of these workers are on the staff of the State board of public welfare and work on the Indian reservations in behalf of Indian children under the direction of the State supervisor of child welfare.

Under the Johnson-O'Malley Act the Secretary of the Interior again this year negotiated contracts with the States of California, Washington, and Minnesota for the education of Indian children, and with the State of Wisconsin for child-welfare services. A limited contract was entered into for the first time this year with the State of Arizona for the education of Indian children in public schools.

The Works Progress Administration project, having for its object the repair, preservation, recording, indexing, and filing of many thousands of maps, was completed during the year, except the final preparation of the indexes. These valuable maps have been repaired and are now in the custody of The National Archives.

A second project for the indexing of approximately 25,000 deeds and other miscellaneous documents in the Records Section of the Land Division has been practically completed and the indexes are now in use.

Interdepartmental Rio Grande Board

Use of land is the main basis of Indian economic life. This land is situated amid lands not owned by Indians; often it is a critical part of watersheds whose total fate determines the fate of all the populations dwelling within them. Every technology of land use is needed by Indians, and they can contribute—have contributed—important technologies and modes of social action to the land-use programs of the whole country.

Therefore, the land-use program of the Indian Service no longer is insulated into one Federal service; the Indian land-use program is part of the warp and woof of the economic enterprise of the several regions.

The most representative expression of these facts is the work of the Interdepartmental Rio Grande Board, whose active membership now consists of the Departments of Agriculture and Interior as departments, and of the Bureau of Agricultural Economics, Forest Service, Soil Conservation Service, Indian Service, Grazing Service, and Reclamation Service. Consulting members are the National Resources Planning Board, the Reconstruction Finance Corporation, and the General Land Office.

The Interdepartmental Rio Grande Board is in no instance an administrative agency; but through the consultations of the agencies that make it up, and through the researches and contacts by its whole-time officers, the Board is influencing the horizon and the particular methodologies of each of its component groups, within the historically richest watershed of the United States.

Ethnically, the Rio Grande watershed has no parallel anywhere, being inhabited by pure-blood Indian tribes, an ancient Spanish-American population with much Indian blood, and a more recent population migrated from other parts of the United States. The resources of the watershed, acutely diminished through prolonged overuse, do not suffice for adequate support of the population dependent upon them for immediate subsistence. Yet into this watershed's economy, commercial exploitation has been thrust; and not alone today, but through more than a generation past. Wreckage of the uplands has brought dangerous wreckage of the irrigated lands along the river and has complicated the water-supply problem all the way from the Colorado line to the Gulf of Mexico.

The central task of the Interdepartmental Rio Grande Board is to discover, and through indirection to put into effect, measures giving a permanent future to the native rural populations of the watershed, while correcting, before it is quite too late, the devastating misuse of the lands in the area. Incidentally, a new type of administrative coordination and integration is illustrated by the Interdepartmental Rio Grande Board, applicable in principal to many other regions of the country.

THE FUTURE OF THE INDIAN

The Indian race is no longer vanishing. It is neither dying out nor is it rapidly merging into the white society. Indians as Indians will apparently continue as a part of American life for many years.

Population trends.—The Indian population is still more than holding its own in numbers both in the country as a whole and on most of the reservations.

During the past 10 years, the number of Indians listed on current census rolls at Federal agencies has increased at the rate of approximately 1.2 percent per year. This compares favorably with an average annual increase for the population at large, as estimated by the Bureau of the Census as of July 1, 1938, of only 0.7 percent over the past 8 years.

The total Indian population of the United States under the jurisdiction of the Office of Indian Affairs as of January 1, 1939, was 351,878. As of January 1, 1938, the number was 342,497, denoting an increase of 9,381. This increase is due in part to the inclusion of 3,000 unenrolled Navajo in Arizona and of 2,126 Chippewa recently organized in Michigan and an additional 1,157 in Wisconsin. In addition to this Indian population, the Indian Office has under its jurisdiction the education and medical relief of approximately 30,000

natives of Alaska—a total responsibility, therefore, for the welfare of more than 380,000 Indians and Eskimo citizens.

Indian Population in Continental United States Under Jurisdiction of the Office of Indian Affairs, by State, January 1, 1939*

State	Number	Percent of total	State	Number	Percent of total
Total reported.....	351, 878	100. 0	Nebraska.....	4, 687	1. 3
Arizona.....	¹ 49, 898	14. 2	Nevada.....	5, 395	1. 5
California.....	² 23, 131	6. 6	New Mexico.....	36, 489	10. 4
Colorado.....	873	. 2	New York.....	6, 698	1. 9
Florida.....	581	. 2	North Carolina.....	3, 427	1. 0
Idaho.....	4, 209	1. 2	North Dakota.....	11, 401	3. 2
Iowa.....	471	. 1	Oklahoma.....	97, 394	27. 6
Kansas.....	2, 088	. 6	Oregon.....	4, 785	1. 4
Louisiana.....	³ 104	(⁴)	South Dakota.....	28, 578	8. 1
Michigan.....	⁵ 4, 530	1. 3	Texas.....	2, 330	. 1
Minnesota.....	16, 136	4. 6	Utah.....	2, 197	. 6
Mississippi.....	1, 974	. 6	Washington.....	13, 913	4. 0
Montana.....	16, 583	4. 7	Wisconsin.....	⁶ 13, 624	3. 9
			Wyoming.....	2, 382	. 7

* See the Statistical Supplement to the Commissioner's Annual Report for population by tribe.

¹ Includes an estimate of 3,000 unenrolled Navajos under the Navajo central agency.

² Decrease due to a new estimated figure for unenrolled population.

³ Revised estimate.

⁴ Less than $\frac{1}{10}$ of 1 percent.

⁵ Increase due to the enrollment of 2,126 recently organized Chippewa.

⁶ Includes approximately 1,000 recently organized Indians in Wisconsin.

Within the continental limits of the United States almost half of the entire Indian population is found in the three States of Oklahoma, Arizona, and New Mexico, in that order.

Another ten States contain about 48 percent of all the Indians in the United States. The remainder of the Indian population is widely scattered with less than 2 percent of the aggregate number in any one State.

The rate of increase is now following an accelerating upward trend. Should the rate of growth for the past quarter century continue for another 25 years, Indians in the United States will number well over 400,000. While this is proportionately a very insignificant figure, it nevertheless presages a very serious pressure of Indian population upon existing reservation lands. Already this pressure is being felt in the Navajo jurisdiction and in others where prospects of acquiring additional lands are not too hopeful.

Assimilation.—Most previous data have tended to confirm the general impression that the Indian is losing his racial identity. The full-blooded population seemed doomed to diminish and finally to disappear, if only through mixed marriages.

Doubt of the inevitability of this trend is raised by detailed analysis recently made by the T. C.-B. I. A.¹ in cooperation with the

¹ Technical Cooperation—Bureau of Indian Affairs, a unit of the Soil Conservation Service which makes surveys of Indian reservations for the use and guidance of the Indian Office.

Indian Office of data on degree of Indian blood on a few selected reservations. These analyses corroborate the belief that the full-bloods are declining at an accelerating rate, and that the rate of decline is the highest where the percent of full-bloods in an Indian community is the smallest. These studies, however, brought to light another trend which is extremely significant; namely, that assimilation of the Indian population into the white race is now being retarded, at least in the Sacramento jurisdiction, the Pine Ridge Reservation, the Lower Brule Reservation, and the Uncompahgre and White River bands of the Uintah and Ouray agency.

On all of the reservations studied, the decline in the percentage of full-bloods and the increase in the percentage of mixed-bloods was marked, but on the Pine Ridge, Lower Brule, Sacramento, and part of the Uintah and Ouray jurisdictions, the quantum of Indian blood among the mixed-bloods is increasing, indicating not only that intermarriage between mixed-bloods and full-bloods is fairly common but also that mixed-bloods are now tending to marry back into the Indian group rather than to marry whites.

This trend arises from the fact that most Indian communities are no longer parts of frontier or pioneer white communities where the number of white men greatly exceeds the number of white women. As the sex ratio among whites becomes more and more normal, the chief reason for intermarriage is removed, and in some areas, such as California, distinct barriers to intermarriage are appearing. The T. C.-B. I. A. study of Pine Ridge pointed out the correlation between a trend toward normal sex ratio among whites and the decline in intermarriage between Indians and whites. Similar studies in other areas might provide a basis for determining whether the trend toward assimilation where it exists is to be permanent, or whether it is merely the result of a temporarily abnormal condition in the white population.

The Indians, both mixed- and full-blood, who remain members of Indian communities, find themselves forming a more and more definitely self-conscious racial minority group. The data are still far too incomplete to make possible definite conclusions concerning the long-time trends in degree of Indian blood. They do give some indication, however, that in a few areas the Indian population is not blending with the surrounding population at so rapid a pace as during the past few years, but that, as with other racial minorities in this country, especially the Negro, the Indians are gradually becoming a racial group whose members will theoretically have, on the average, slightly less than one-half Indian blood if the full-bloods die, out, and racial exogamy entirely ceases. This tendency will un-

doubtedly be exaggerated on such reservations as Lower Brule, where white-owned land is being bought up by the Government in an attempt to make the reservation entirely Indian owned, and therefore entirely Indian occupied, thereby decreasing opportunities for Indian-white contacts.

Similar situations occur elsewhere in allotted areas where inter-spersion with whites has resulted in a rapid assimilation of the Indian. As timber is removed, as the fertility of the soil is lost, the whites tend to move on. In many areas where Indians live, the white population is decreasing, and opportunities for Indian-white contacts likewise are on the decrease.

The future of Indian culture is brighter today than at any time since the advent of the white man. Not only will it continue to give deep satisfactions to the Indians themselves, but in its interaction with the white culture will make fundamental contributions to the improvement of the American design for living.

The Indians of the United States constitute a very small fraction of the Indian population of Pan-America. Twenty-five or thirty millions of Indians, many living according to their old concepts and traditions, may yet furnish a common basis for the development of a more closely integrated life among all of the Americas.

Recently a seminar-conference of Canadian and American Indian Service officials, missionaries, and anthropologists was sponsored by Yale University, the University of Toronto, and the Carnegie Corporation. This is the beginning of efforts of American States with Indian populations to share experience in methods and problems. A much larger conference, including all of the countries of North, South, and Central America was scheduled last year to be held at La Paz, Bolivia. Conditions in that country forced postponement of the conference, but it is expected that it will be held during the summer of 1940.

OFFICE OF EDUCATION

J. W. Studebaker, *Commissioner*

INTRODUCTION

■ T seems fitting that the 1939 annual report of the Office of Education should review progress not for 1 year alone, but at least briefly, for the entire period from 1869 to 1939. The former year marked the placing of the Office of Education with the United States Department of the Interior; the latter year marked the transfer of the Office to the newly created Federal Security Agency. The transfer, effective July 1, 1939, was a part of the President's Reorganization Plan.

REORGANIZATION

In his message of April 25, 1939, to Congress, the President said:

Because of the relationship of the educational opportunities of the country to the security of its individual citizens, the Office of Education with all of its functions, including, of course, its administration of Federal-State programs of vocational education, is transferred from the Department of the Interior to the Federal Security Agency. This transfer does not increase or extend the activities of the Federal Government in respect to education, but does move the existing activities into a grouping where the work may be carried on more efficiently and expeditiously, and where coordination and the elimination of overlapping may be better accomplished. The Office of Education has no relationship to the other functions of the Department of the Interior.

The President's Plan also affected the Office of Education in that it transferred the Radio and Motion Picture Divisions of the National Emergency Council to the Office.

RECORD OF EFFORT AND PROGRESS

Thus with the passing of 1939, the 70 years of association of the Office of Education with the Department of the Interior were concluded. And thus the 1939 report is the concluding chapter under the Department, in a long series of chapters which have recorded educational effort and progress throughout the United States and other countries.

FIRST TIME SUITABLY HOUSED

During the past 2 years the Office of Education, for the first time in its history, has been suitably housed for effectively and economically carrying on its wide range of educational activity. The Office, during 1939, received thousands of visitors who hold important positions in the States and in many foreign countries. The offices in the new Interior Building have most creditably served the need. The library of some 250,000 volumes—one of the largest of its kind in the world—has during these 2 years been adequately housed and is serving the largest clientele it has ever served.

Other facilities that the Office has available in the new Interior Building include the art gallery, conference rooms, museum, and auditorium. Their availability has added greatly to efficiency not only for the staff but for conferees and others coming to the Office on important educational missions.

Reviewing a bit more, it was 72 years ago when, by an act of the Thirty-ninth Congress, approved March 2, 1867, a Department of Education was created for the purpose of collecting and diffusing information concerning the condition and progress of education in the several States and Territories, and of promoting the cause of education in other ways. For two years, this Department functioned independently. Then, in 1869, its title was changed from the Department of Education to the Office of Education and the agency was placed with the Department of the Interior. In 1870, the Office became the Bureau of Education and this title was retained until 1929, when it again became the Office of Education.

At various periods in the history of the Office of Education certain administrative duties have been added to its original functions. In 1885 it was designated to take charge of the education and welfare of the natives of Alaska, in which capacity it continued to act until 1931, when these duties were transferred to the Bureau of Indian Affairs.

By the Land-Grant act of August 30, 1890, known as the second "Morrill" Act, the Secretary of the Interior was charged with the administration of the acts concerning land-grant colleges. The Office of Education was made responsible for the task of obtaining and reporting upon the information required.

In 1933, the functions of the Federal Board for Vocational Education were assigned to the Office of Education.

Since 1936, various allotments from Federal Emergency Relief Funds have been made to the Office of Education for educational

projects. These projects have been carried out under the supervision of the Commissioner of Education.

There have been 10 Commissioners of Education during the period as follows: Henry Barnard (1867-70), John Eaton (1870-86), N. H. R. Dawson (1886-89), William T. Harris (1889-1906), Elmer Ellsworth Brown (1906-11), Philander P. Claxton (1911-21), John James Tigert (1921-28), William John Cooper (1929-33), George F. Zook (1933-34), and the present Commissioner, J. W. Studebaker (1934 to date).

In 1929, Congress provided for an Assistant Commissioner of Education and Bess Goodykoontz has served in that capacity during the period from 1929 to date. J. C. Wright, who was Director of the Federal Board for Vocational Education, has served since 1933 to date as Assistant Commissioner for Vocational Education, and C. F. Klinefelter has served as Assistant to the Commissioner since 1937.

THE EDUCATIONAL SITUATION

Viewing the educational situation during the year 1939, the following are some indications, activities, and trends that seem significant:

ELEMENTARY AND SECONDARY SCHOOLS

In spite of the decrease in elementary school enrollments, approximately 75 percent of the children and young people attending, and 60 percent of the teachers employed, are in the elementary schools.

The Office of Education and a number of organizations primarily interested in the field have sponsored conferences during the past year for the purpose of giving increased attention to the problems.

As evidenced in State programs, attention is being given to guaranteed minimum school terms, and to the raising of certification requirements for teachers in elementary schools. The use of radio and visual aids, extension of library services to elementary schools, especially in rural areas, the emphasis upon health, safety, speech, conservation, and character education, and the inclusion of parents and other citizens of the community in planning the education program, are among developments which hold increasing importance.

The public high school continues to attract students in increasing numbers. It also continues to bring an ever-expanding diversity of types. Reliable statistics place the number of students taking high-school work of all types—junior, senior, 4-year, evening, special—at about 7,750,000.

In the effort to adapt the educational program to all young people, fundamental changes have occurred and are occurring both within and without the schools. In recent years the high school has greatly expanded its offerings, especially in training for health, citizenship, and vocational competence. Guidance service, always a part of real teaching, is being emphasized and extended through supplying assistance and advice from trained and qualified specialists and counselors. The educational significance of student activities is respected perhaps as never before. Teaching methods are being modified to fit the individual student needs. The surpassing value of activity and practice in relation to instruction is recognized in cooperative and part-time programs in the schools, in Civilian Conservation Corps camps, and in National Youth Administration projects. The changed and changing viewpoint is evidenced in the emphasis on broad outcomes, not only in the scholastic field but also in habits, skills, tastes, appreciations, and attitudes.

HIGHER EDUCATION

Enrollments in institutions of higher education continue to increase. It appears with such increases that a larger and larger fraction of the students find it necessary partially or wholly to support themselves while in college. Institutions of higher education are therefore having to find work opportunities or provide scholarship funds or loan funds for an increasing proportion of students. The National Youth Administration, which has continued through 1939 to help approximately 10 percent of students enrolled in colleges, has been of very great service.

As college enrollments increase, it is becoming more evident that a large number of young people now in college will make their living at occupations only slightly related to their college training. This has accentuated certain trends: (1) Colleges are broadening their curricula, thus making adjustments to young people not keenly interested in the more abstract forms of learning; (2) colleges are making more frank acknowledgment of the fact that the primary function of liberal-arts education is not its aid in making a living but its aid to a richer and happier life; (3) colleges are experiencing difficulty in financing their programs. Because of this many of them are resorting to raising student fees even at a time when increasing numbers of students find it necessary to work their way at least in part through college. Since privately controlled institutions depend more largely on fees than do publicly controlled institutions, the tendency of students to select publicly controlled institutions is proving a serious financial handicap to privately controlled institutions. At the same time the

reduction in interest rate on securities held as endowment by colleges is operating more seriously to handicap the privately controlled institutions than the publicly controlled. These financial trends are constituting a serious problem for many privately controlled institutions.

A new plan of State surveys of higher education was tried in 1939. In general, requests to the Office of Education to make surveys of higher education in a given State have either not been possible due to lack of facilities or have been accepted and staff members assigned to devote a considerable amount of time to them. The survey in 1939 of higher education in the State of Nebraska, however, has been conducted largely with the help of Nebraska educators working with a staff member in the Division of Higher Education acting as adviser. This survey was broken down into projects and each project carried out by a local Nebraska committee. The reports of these projects were then submitted to a central committee of which the staff member in the Office of Education was chairman. The central committee was responsible for recommendations growing out of the group of committee reports. It is believed that this method has merit in that it enables the Office of Education to participate in a greater number of surveys and at the same time assures the permanent interest of the State people in the results of the survey because they have been directly responsible for the studies underlying it.

A committee consisting mainly of leaders in the field of graduate education, notably deans of graduate schools, cooperating with President Isaiah Bowman, Johns Hopkins University, in preparing under the leadership of the Office of Education, a fundamental report on objectives of graduate education in the American democracy. It is this plan of cooperation among leaders in education, stimulated and guided by the Office of Education, which represents one of the significant contributions which the Office of Education should be able to make.

LIBRARY SERVICE

Adequate library service is essential in any educational program. With a view to attaining this adequacy, librarians during the past year have been attacking especially such problems as equalization of facilities offered, evaluation of service rendered, effective utilization of resources, determination of unit costs, classification of personnel, and in-service training.

Upon each of these problems, progress has been made. In the matter of equalizing opportunity figures released by the American

Library Association show that approximately 3,000,000 more persons now have access to public-library facilities than in 1934. Office of Education statistics in process of compilation also indicate an encouraging growth in the library service. Librarians have continued to press for State aid as necessary in remedying the economic inability of certain localities to provide essential library facilities. During the year one southern State, hitherto without a library extension agency, created one; and five States either amended laws or passed new ones permitting larger units of library administration.

In the school library field, emphasis has been placed upon the need for developing elementary school libraries, a branch of the work which many feel has lagged in comparison with secondary school libraries. In the evaluation of library service, the influence of the Cooperative Study of Secondary School Standards has continued to spread. This study has indicated that quantitative standards of equipment and service are not satisfactory bases for judging library efforts, and that the facilities and service must be judged in the light of what the school is trying to do.

Impetus has been given to the libraries of teacher-training institutions by grants made to 29 institutions from an educational foundation. Junior colleges and liberal arts colleges have already been the beneficiary of similar aid.

SOME MAJOR PROJECTS

STATE PROGRAMS STUDIED

During the year the Office of Education undertook a comprehensive study of the organization and functioning of State programs of education. Since the study of the States' relation to higher education has been under way for several years and certain aspects of the study have already appeared in print, the present series of studies serves to round out the picture of the ways in which the States function in providing public education for their citizens. Library service, an outstanding part of a State's educational program, is included in the study.

Every State in the Union has established at least one State agency for administering its educational program—the State department of public instruction, or a department of similar name. Every State has established at least one State board or commission with educational functions either of a general or of a special nature. In each of these aspects of the programs of education, however, the States vary greatly. They also change greatly over a period of years.

These changes represent continuous efforts on the part of State departments of education to increase the efficiency of State services in improving educational conditions and in keeping such services in step with changing conditions. Each State recognizes that the experiences of other States in organizing and maintaining educational services are of value in planning its own services. Therefore the United States Office of Education is frequently asked for information as to practices current in the various States, and particularly those in which State departments of education are engaged.

Consequently, the series of studies includes careful analysis of (1) the wide variety of ways in which State departments of education and State library departments are organized to perform their functions, (2) their powers and duties, (3) the extent of their personnel, and (4) their relation to other departments of the State government. Included also is a study of the several State boards of education, their organization and functions. The chief State school officer, as the responsible administrative officer for the State's educational program, is the subject of another part of the study. All of these studies will attempt to bring the history of State school programs up to date, and to describe the current status of each aspect of their organization and operation.

Among the functions exercised by State departments of education are those of organizing or assisting local school districts to organize schools; administering the compulsory attendance laws; establishing programs of study and preparing courses of study; establishing the qualifications necessary for teachers and certificating teachers; administering the State school funds; promoting and supervising effective instructional programs including special facilities for vocational education, for health education, for the education of youth and adults, for handicapped and other exceptional children; providing for the school census and recording and reporting school statistics for the State. Each of these functions and some additional ones will be the subject of separate study and report. Similarly for library service the operations of State boards, State libraries and other State agencies and officials will be the subject of separate report.

During the year ended June 30, 1939, committees of from two to five members of the staff have visited 30 States, interviewing State officials, collecting information on a series of interview sheets prepared for the purpose, gathering printed material and documents of various types, and securing much helpful advice from school officials. The remainder of the States will be visited, and analysis of the data and preparation of the reports are under way. At the present time it is planned to issue separate reports as listed below on the next page:

Organization and operation of State boards of education.

The chief State school officer: His status and functions.

The organization of State departments of education.

Functions of State departments of education in the organization and administration of schools.

Functions of State departments of education with respect to school finance. State supervisory and instructional programs.

State supervisory programs at the elementary level.

State supervisory programs at the secondary level.

State supervisory programs in special education.

State supervision of schools for Negroes.

State supervision of health, safety, and physical education.

State supervisory programs for youth and adults.

State supervisory and instructional programs in parent education.

State supervisory and instructional programs for art and music, and for radio and visual aids.

State curriculum programs.

Standardization and accrediting of schools by State departments of education.

Supervision of physical plant facilities by State departments of education.

Pupil personnel services, as functions of State departments of education.

State programs for the preservice education of teachers.

Organization and operation of State agencies for library service.

INTERNATIONAL INTELLECTUAL COOPERATION

The Office of Education worked in cooperation with the Department of State in considering various invitations during the year to the United States from the governments of other countries to participate in international meetings and activities as follows:

Fourth World Congress of Workers for Cripples, London, England.

Eighth International Conference on Public Instruction, Geneva, Switzerland.

Fifteenth International Congress of the History of Art, London, England.

Thirty-first Congress on Esperanto, Bern, Switzerland.

Twenty-second International Congress against Alcoholism, Helsinki, Finland.

International Exposition of Rural, Family and Household Documentation, Liège, Belgium.

International Family Days, Liège, Belgium.

Twenty-seventh Congress of Americanists, Mexico City, Mexico, and Lima, Peru.

Seventh International Congress of Genetics, Edinburgh, Scotland.

Fifth International Congress of Linguists, Brussels, Belgium.

International Film Festival, Cannes, France.

Eighth Pan-American Child Congress, San Jose, Costa Rica.

Nominations of suitable delegates were made in case of acceptance.

INTERAMERICAN UNDERSTANDING

The Office of Education, in connection with the eighth conference of the World Federation of Education Associations, this year published a bulletin on Education in the United States of America.

Through the helpful cooperation of the National Education Association and the World Federation of Education Associations, the publication was translated into Spanish and Portuguese. It was prepared as "a modest contribution toward inter-American cultural understanding." Many schools, colleges, and other agencies contributed numerous illustrations and other material toward making the publication valuable. More than 7,500 free copies have already been distributed in the United States and in South America.

PLANNING WITH STATE DEPARTMENT

It has been the policy of the Office of Education to seek wherever possible to coordinate its activities with related activities in other departments of government. The new Division of Cultural Relations in the State Department was charged with administrative responsibility over the program of government fellowships established by the Buenos Aires Pan-American Congress in 1936.

To select these students and professors, and to make the necessary contacts with the universities in this country and in the Latin-American republics, is primarily an educational job. The Division of Cultural Relations had optional procedures from which to choose. It could establish these educational contacts itself, and thus in considerable part duplicate the machinery which has already been established and must be continuously maintained in the Office of Education, or it could enter into an agreement with the Office under which the work would be done by the Office of Education according to plans previously agreed upon by the Division of Cultural Relations and the Office.

After a series of conferences, the latter alternative was adopted, and a memorandum of agreement signed by the Secretary of the Interior and the Secretary of State which divides the responsibility between the Division of Cultural Relations and the Office of Education.

This agreement is itself significant as a measure of economy and efficiency in government, but it is even more significant as a type of relationship which can be worked out successfully in many educational areas which lie within the interests of the several departments of government.

ASSISTANCE TO FOREIGN STUDENTS

Considerable help is given to foreign students who come to this country and Americans who study abroad by interpreting the studies taken in other countries in terms of the education systems of the

United States. This service of the Office is rendered mainly to admissions offices of colleges and universities and its purpose is to place such students so that they can work here to the best advantage to themselves and the satisfaction of the institutions they enter. Such a service should be a potent factor in promoting better intellectual cooperation. How widely its effects can be felt is shown by the fact that during the year credentials came from 30 European countries, 11 Asiatic, 4 African, 16 Latin American, 5 other American, Australia, New Zealand, and 3 of the outlying parts of the United States, making a total of 71 different political areas in all parts of the globe. The requests numbered 1,040.

One hundred fifty-five cases that had previously been handled were for one reason or another reviewed.

This wide representation from abroad also scatters widely in the United States. The 1,040 requests for evaluations came from 40 of the States, the District of Columbia, and the Philippine Islands.

The admissions officers of 167 colleges and universities and 13 high schools requested information of one kind or another regarding the placing of foreign students.

ADULT CIVIC EDUCATION FORUMS

Forum demonstrations under direction of the Commissioner of Education were continued during the 1938-39 season in some of the smaller communities of the country. Three hundred thousand dollars of Federal funds was allocated to the Office to finance such programs. Instead of the funds being allocated to city or county superintendents to be administered locally, they were used for four main purposes under direct supervision of the Office:

For the employment of a Washington staff composed of an assistant administrator, a field counselor, a field representative, 2 secretaries, and 4 typists qualified by the local W. P. A.

A staff of about 300 relief workers assigned to communities throughout the country.

For the employment of 15 forum leaders who traveled from area to area, staying from 3 to 5 months for each program.

For the employment of 15 forum counselors working through 15 State departments for 3½ months.

The cooperative demonstration centers, as they were named, were in 15 areas of the country. Each area served from 5 to 10 communities and were centered at: Santa Ana, Calif.; Atlanta, Ga.; Kalamazoo, Mich.; Minneapolis, Minn.; Gulfport, Miss.; Trenton, N. J.; Schenectady, N. Y.; Santa Fe, N. Mex.; Fargo, N. Dak.;

Portland, Oreg.; Columbia, S. C.; Providence, R. I.; Ogden, Utah; Seattle, Wash.; Milwaukee, Wis.

During the last quarter of the year the State Departments of Education in 15 States selected State forum counselors who, with the help of W. P. A. workers, organized planning conferences throughout these States to assist local school authorities in the establishment of forums with local resources. The salaries of these counselors were paid by the project. Each of the following States was served by a forum counselor: Arkansas, California, Georgia, Mississippi, New Jersey, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Texas, Vermont, Washington, and Wisconsin.

The emphasis of the 1938-39 program was placed on the problem of organizing and administering forums in smaller communities with populations of 1,000 to 25,000. The objective of the demonstration was to plan and administer a program in areas where several independent school systems of limited resources might cooperate and pool their funds to provide educational forums under qualified leadership. The cooperative forum programs sought to demonstrate a practical means by which a leader may be shared by several school districts.

Local advisory committees were established and usually assisted the local superintendent in selecting the subjects to be discussed which were, of course, within the field of study of the forum leader. Such advisory committees made up of representative citizens also helped in promoting interest in the program.

Each forum leader, in addition to the "regular" scheduled meetings at established centers which were often conducted with related subjects on a weekly or biweekly basis, also conducted "off schedule" meetings usually at organized club groups in the community. Such meetings acquainted large sections of the population with the forum demonstration. Many of these "off schedule" meetings were with student audiences at high schools and institutions of higher learning.

Efforts were made to acquaint audiences with suitable reading material on public affairs; pamphlet displays were set up and bibliographies were mimeographed and distributed. Libraries were often inadequate to help but where possible cooperation with local librarians was established.

In the 196 communities served by the forum leaders, 1,332 "regular" meetings were held. In this same area 1,160 "off schedule" meetings were held. The total attendance for the "regular" meetings numbered 151,970, for the "off schedule" 247,234.

Relief workers also assisted some 30 communities to carry on forum and adult civic education programs. From both these groups a total of 1,949 meetings were held with an attendance exceeding 169,788.

Since the beginning of the project more than 500 communities in 40 States have participated in the forum program; 36 State conferences have been conducted; 9 Office of Education publications dealing with various aspects of this field of education have been published and widely distributed; more than 17,000 meetings have been conducted with a total attendance of almost 2,000,000.

COOPERATION WITH PUBLIC SERVICE GROUPS

The Office of Education cooperates with many and various types of organizations. During the past year the American Association of University Women requested the Office to prepare a series of discussion outlines for the use of study groups of its local branches. Thus far, seven such outlines have been prepared. Most of these were first mimeographed and sent to members of more than 100 local branches. Demand for the outlines was so great not only from members of that organization but from other organizations and from individuals interested in studying the public-school system that the supply was soon exhausted. In view of this interest the Office of Education printed the outlines as a series of leaflets under the general heading *Know Your School*. The titles of the outlines published during the year are *Know Your Board of Education*, *Know Your Superintendent*, *Know Your School Principal*, *Know Your Teacher*, *Know Your School Child*, *Know What Modern Elementary Schools are Doing*, and *Know How the Schools are Financed*.

Sensing the constant need to stimulate interest of parents in the study of local and home education problems, the National Congress of Parents and Teachers cooperated with the Office of Education in the production of a radio series entitled *Wings for the Martins*.

This series presented familiar home problems of education and suggested means for some solutions. Broadcasts embraced such subjects as the kindergarten, report cards, selection of a college, school boards, library, and playgrounds, and their relation to the life of an average American family.

The series began November 16, 1938, and continued to May 4, 1939. An average of 75 N. B. C. stations carried this program to their communities.

Planning committees representing the Office of Education, the National Congress of Parents and Teachers and representatives of the National Broadcasting Co. developed the program outline.

The National Congress of Parents and Teachers especially aided in the building of audiences for the series among its 2,000,000 members through its publications, conventions, and conferences throughout the country. Letters received during the course of the series told of the utilization of these programs at P. T. A. meetings and of the establishment of P. T. A.-sponsored listening groups. The study guides issued were frequently made the basis of group discussions.

More than 25,000 letters were received during the 26 weeks of broadcasting.

EDUCATIONAL BROADCASTING

The Radio Project of the Office of Education began the fifth year of demonstration and service in educational broadcasting with an attendant growing interest in radio education by schools and colleges, civic groups and mass audiences generally. To serve the needs of these groups and audiences the following major activities have been carried on: National educational radio programs presented in cooperation with national chains, local radio stations, Government agencies such as the Smithsonian Institution, and national associations such as the National Congress of Parents and Teachers; during the past year the Educational Radio Script Exchange continued its work as a "clearing house" for recordings, scripts, production aids, and other information to help promote more effective use of radio for educational purposes.

Concurrently, the Radio Project sponsored additional enterprises to promote the cause of education by radio: Cooperative research projects were developed in problems of education by radio and carried on in cooperation with colleges and school systems; cooperative radio demonstration centers for experimentation in use of radio for education have been sponsored at colleges, universities, and in local school systems.

Operating under a Works Progress Administration allotment, the Radio Project has carried forward the aims of the Federal Government to give work to persons in need of work and to help restore them to normal employment. The project has given employment to 245 workers per month in 17 States. Many of these were able to return to private enterprise.

Two coast-to-coast radio series dramatized and emphasized democratic ideals:

Americans All—Immigrants All, a series of 26 half-hour broadcasts, was presented during the year in cooperation with the Columbia Broadcasting System and the Service Bureau for Intercultural Education. These programs told of the gifts men and women from

many nations brought to our national life and culture. The series was carried by 107 stations and prompted 85,000 written responses from listeners. The Women's National Radio Committee singled out the series as the "most original and informative program of 1939."

Democracy in Action is the title of a series of half-hour programs interpreting the Federal exhibits at the New York World's Fair and dramatizing government at work. This series, presented in cooperation with the Columbia Broadcasting System, continues into 1940. Transcriptions of the broadcasts will be made available through the Script Exchange.

Two other network series were produced in 1939 by the project:

Wings for the Martins, in a series of 26 half-hour broadcasts, dramatized problems confronting a typical American family in its attempt to educate its children.

The World Is Yours continued into the fourth year its half-hour dramatizations of history, exploration, and science, depicting the exhibits and fields of activity of the Smithsonian Institution. Listener response to this series, presented in cooperation with the National Broadcasting Co., continues to be heavy, with 152,450 letters for the year.

Local Government at Work is a series of programs prepared for the Educational Radio Script Exchange. These scripts have been written in cooperation with national police, fire, and municipal officer associations. Presented locally by school or civic radio production units, these scripts promote an understanding of the work of the city or county governments.

Program planning and script writing have also gone forward on housing, vocational agriculture, home economics, guidance, and other subjects.

EDUCATIONAL RADIO SCRIPT EXCHANGE

The Script Exchange designed as an aid to school and civic groups interested in the study and production of educational broadcasts attained a new level of service in 1939, when 72,000 copies of scripts were requested. Since this service was inaugurated about 250,000 copies of scripts have been made available to approximately 7,000 groups and institutions, including colleges, universities, high schools, radio stations, civic and private organizations. These figures are particularly significant in view of the fact that not more than one copy of any script was given or loaned to any one group.

Early in 1939 the exchange released a new supplement to its catalog of scripts, listing 100 additional scripts and bringing the total number of scripts offered to 281. Scripts listed in the catalog pre-

sent a wide variety of subjects and utilize varied radio techniques. In addition, the exchange has assembled a reference library consisting of approximately 2,000 educational scripts.

Many of the scripts issued by the Script Exchange are accompanied by production notes and theme music. A Radio Glossary, Handbook of Sound Effects, Radio Manual, and a Radio Bibliography are available to organizations seeking to become adept in the art of production. More than 16,000 copies of these production aids and supplementary materials were requested during the past year.

Information.—The exchange, through its "central clearing house" work, gathers and disseminates information about educational radio by way of correspondence, survey reports, articles, and personal consultation. The exchange circularized 1,686 colleges and universities in the United States asking data on specialized courses in the field of radio. Results of this survey have been widely disseminated and copies of the report are available from the exchange.

Network programs frequently cannot be utilized by schools because of conflicting time schedules. For that reason teachers and administrators have been asking for recordings of radio programs. Early this year a grant from the Committee on Scientific Aids to Learning of New York City made possible the recording of *Americans All—Immigrants All*. These transcriptions are made in two sizes—12-inch records playable on ordinary phonographs and 16-inch records, for which "play-back" equipment is needed. The number of orders for recordings which have already been received in the Script Exchange bear testimony to the widespread interest in the new service.

Contributions by the network and cooperating agencies resulted in a favorable project-sponsor ratio for expenditures. On the average this ratio was \$1 from the Government to \$4 from private industry.

More than 300,000 postcards, letters, telephone calls, and telegrams reached the Office of Education from radio listeners.

The Office of Education has stimulated the development of local school and college radio producing groups to study broadcasting and to cooperate with local stations. These groups have grown from fewer than 300 in 1936 to more than 800 in 1939.

These activities have been carried on with emergency funds and with temporary personnel. But radio is here to stay. The longer it stays the more strikingly does it reveal its undreamed of possibilities for education. It is to be hoped that the day is near when the Office of Education will be equipped to demonstrate these possibilities on a permanent basis.

THE FEDERAL RADIO EDUCATION COMMITTEE

The Federal Radio Education Committee is composed of 40 members, scattered throughout the country. In the interest of conserving the limited funds available for travel and administration it has been felt that the expense of bringing the entire committee together in Washington should not be incurred unless there was urgent need for doing so. Instead, the formulation of policies and practices is done by a small executive committee of nine members composed of four broadcasters, four educators, and one representative of the Federal Communications Commission.

As a major piece of research and investigation, the Office of Education has this year undertaken to do a study for the Federal Radio Education Committee. With funds pledged by the National Association of Broadcasters, the Commissioner of Education, who is chairman of the committee, early in 1939 appointed as assistant to direct the Office study, as well as to coordinate the research studies and services being carried on under the sponsorship of the Federal Radio Education Committee.

The Office of Education study has a threefold purpose. First, a study of successful efforts by local broadcasters to cooperate with civic and other nonprofit groups. This survey to discover, analyze, and interpret the activities of local broadcasters, is expected to reveal ways and means of applying demonstrated successes to other communities.

Another important aspect of the study is the survey of the whole question of teacher-training and college courses in the field of radio. This project is intended to answer certain fundamental questions regarding the school use that is now being made of radio, together with college-course offerings for the training of teachers in the preparation and utilization of radio, as well as for professionalizing the personnel of broadcasting stations. On the basis of this study, courses will be analyzed and suggestions will be made for their effective use. Bibliographical information and sample composite outlines of courses will be made available to interested institutions.

The third aspect of the study is the development of an experiment and idea exchange, from which the findings and resources of various experiments and experiences in commercial stations, universities, and other groups may be brought together and made available through a national clearing house.

The combined funds that have been provided by various agencies and organizations to underwrite the several research studies derived from the study program of the Federal Radio Education Committee,

at the present time, total approximately \$500,000. A brief account of the research studies now in progress outside the Office of Education follows: A study of listening groups is being directed from the American Association for Adult Education and is financed by the Carnegie Corporation. This survey will examine the educational value of organized listening groups and the organization and motivation behind them. The study will be conducted in two parts—the first to deal with the relative merit of listening in a group as compared with listening alone; and the second, to study the organization, the motivation, and the objectives of listening groups now existent, both in the United States and in Europe.

A Study of the Problems and Methods of Broadcasting to and by Schools is conducted from Ohio State University. It is financed by the General Education Board. Since the preparation and production of school broadcasts represent a large investment in terms of radio time, talent, and staff, one of the most important steps in educational broadcasting is centered in the evaluation of radio broadcasts for schools. It is expected that this study will represent a careful and comprehensive plan for gathering evidence, developing techniques, and establishing criteria for guidance in the planning of future programs.

A Study of the Essential Value of Radio to All Types of Listeners being conducted for Princeton University is financed by the Rockefeller Foundation. A well-coordinated research project has been formulated so as to give trained investigators an opportunity to study the essential value of radio to all types of listeners. It is proposed that this project shall determine what makes a radio broadcast "effective" before adult broadcasting can become consistently "effective." This project has been under way for 2 years, and a recent new grant of funds will permit its continuance until June 1, 1940.

The study program of the Federal Radio Education Committee is the development of the combined efforts of men in the field of broadcasting, having practical problems to be solved, and of educators facing the problem of learning how to make the best use of the medium of radio under the American system of broadcasting. The combined results of this leadership in the coordination of several major studies and experiments should fill a long-felt want for that body of authoritative literature which characterizes the maturity of any field.

IMPROVEMENT OF NATIONAL STATISTICS

In carrying out the long-time cooperative program on school records and reports with the States this year, the Office of Education

was able to give individual advisory and consultative service to eight State departments of education in their revisions of records and reports, and to 48 State departments of education in their collecting of statistics for the Biennial Survey of Education.

Through personal and regional conferences in the program for uniform records and reports, the States have had opportunities individually and collectively to consider the findings of analyses and to discuss proposed changes in forms and procedures, as submitted by the Office of Education with the counsel and advice of the National Advisory Committee on School Records and Reports. Furthermore, as changes have been effected through new and revised forms, States, after attempting to use them for a year or two, have recommended further changes and modifications. This procedure helps in the production of materials of greatest use to the States. That the States are decidedly interested is evidenced by the fact that more than two-thirds of the States reported in November 1938 that they had made revisions of some or all of their recording and reporting forms in accordance with the findings and recommendations of the cooperative program.

Recent surveys of the status of libraries have shown the need for adequate and comparable statistical data on library coverage, service, growth, personnel, income, and expenditures. These are basic facts essential in studying present library conditions and in planning for future progress in libraries.

The Office of Education has undertaken a Nation-wide collection of public library statistics and has made the preliminary preparation for a similar gathering of data from the institutions of higher education. The figures for public school libraries, last gathered in 1934-35, will be requested again as soon as the two studies just mentioned are completed. According to present plans, these statistical surveys will be made at periodic intervals, so that a fundamental body of library data will be available.

For the study of public library statistics the Office of Education is using a uniform blank devised after study and numerous conferences by a committee composed of representatives from the State library agencies, the American Library Association, and the Office of Education.

In requesting returns the Office of Education has worked either through the State library agencies or directly with the individual libraries in a given State, according to the preference of the State agency. As a result of a letter of inquiry addressed to these agencies from the Office of Education, 30 States elected to collect the figures

for the Federal Office, 12 preferred to have the Office of Education collect directly, 4 had no agencies operating, and 2 have been unable to complete plans for the collection of public-library statistics.

Under this new plan of cooperative effort the same form is being sent out at approximately the same time by the information-seeking agencies. Heretofore, a public library has been receiving from three or four different sources, requests for statistical information at different times, with no two question blanks the same, and definitions of terms, if given, not always consistent. Now the State agencies, with a few exceptions, are using the blank for their own collection of statistics and the American Library Association is likewise using it for the annual figures requested from a selected group of institutions.

Reports from many libraries indicate greater facility in answering the questions, as a result of the uniform blank and the cooperative method of making the study. There is promise, therefore, of obtaining a high percentage of returns from the reporting libraries. The National Committee on Municipal Accounting has accepted as standard the classification of finances on the report form.

Following a procedure similar to that used in the public-library form, a blank has been devised to meet the special needs of college libraries. The expected use of this statistical form by the fact-gathering agencies, including the Office of Education, should insure comparable and adequate data on college libraries for administrators and librarians.

The emphasis, during the year, placed on conferences and committee work on State school statistics, and the use of field service beginning in October instead of January or later have given very complete returns for the 1937-38 chapters of the Biennial Survey of Education. A 100 percent return was received for the public high schools in 41 States and the District of Columbia and in the other 7 States comparatively few of the schools did not report.

DIVISION REPORTS

In addition to major projects in which divisions of the Office have joined in their efforts during the year, the separate divisions have carried on many various activities. A few of these are noted in the following statements from the chiefs of divisions:

AMERICAN SCHOOL SYSTEMS DIVISION

The members of the American School Systems Division conducted studies on problems of school administration, school finance, school buildings, elementary and secondary education, and parent education.

During the year the school buildings specialist completed a study of public school buildings erected with P. W. A. aid to determine how many school buildings had been erected in cities and how many in places outside of cities; to what extent the construction of these buildings had resulted in eliminating small ones; the space provided for play and recreation; the kind of facilities contained in the buildings; and the cost of the buildings.

A school-building study was made of the planning and design of school auditoriums, as an aid to school superintendents and architects in planning auditoriums for school and for community use.

The study of local school units was brought to final completion early in the year and resulted in the publication of two bulletins: Bulletin 1938, No. 10, Local School Unit Organization in Ten States, and Bulletin 1938, No. 11, Principles and Procedures in the Organization of Satisfactory Local School Units. The first-named bulletin shows for 10 States the pattern and historical development of local school-unit organizations; types, size, and number of units; procedures for changing boundaries; and factors encouraging and discouraging satisfactory organization. A summarization of the data for the 10 States is also presented. The second bulletin was prepared to serve as a guide to State and local school administrators in planning studies for their respective school systems.

Federal Funds for Education, 1937-38, is the title of a study made by the specialist in school finance. This study shows the amounts of funds provided each of the States by the Federal Government for educational purposes. Another study in the field of school finance was published as Pamphlet No. 79, Legislative Plans for Financing Public Education. The purpose of this study was to furnish useful information and guidance in the development of State legislation for the financial support of public education.

A digest of the enactments of State legislatures relating to education was prepared by the specialist in school legislation. The review summarizes outstanding measures enacted in 1937 and 1938 affecting education and also the principal tendencies of educational legislation in the United States.

Parent Education Programs in City School Systems is the title of a study completed by the specialist in parent education. The study was prepared to answer inquiries of school administrators and others as to what constitutes a parent-education program, how and for whom it functions, what it costs, what it accomplishes, and what superintendents think of parent education.

Among other studies and materials prepared during the year by the specialists of the Division were:

A suggested administrative report to States. The form represents those data which the States in regional conferences have indicated as desirable, and embraces those items of information needed locally and on a State-wide basis.

Bibliographies: Good References on Fiction Portraying Home Life and Family Relationships; Good References on Mental Hygiene at Home and at School.

Statistical tables showing kindergarten enrollments for 1936-38 in States and in cities of different population size.

The amount and percentage of public-school revenue receipts by sources for each of the States, 1929-30 and 1935-36.

Contributions to Bulletin 1939, Miscellaneous No. 3, "Education in the United States of America," on such topics as elementary and secondary education, administration of education, primary education, school organization, and program of instruction.

Legislative Action Before the Seventy-fifth Congress—outlining bills introduced relating to education and also those enacted into law.

The Selection, Qualifications, and Tenure of Principal State School Officials, as of January 1, 1939.

At the request of the board of education of the post of the United States Marine Corps at Quantico, Va., a study of the school situation, especially as related to the curriculum and to school buildings, was made and a report submitted appraising the curriculum, teacher preparation, and existing school buildings, and making recommendations for the modification of the curriculum, for new housing facilities, and for an adequate staff and budget.

The State school administration specialist has rendered consultative service on school records and reports to the State Departments of Education of Pennsylvania and of Kentucky, and the District of Columbia at their request. At the request of the Florida State Department of Education he acted as consultant on a survey of a county school system of that State. He also acted as adviser to representatives of Columbia University who are conducting a Nation-wide study of the problems of transportation of school children.

The specialist in nursery-kindergarten-primary education acted as adviser to the United States Housing Authority on building facilities for preschool and school children in the new housing projects. She also cooperated with the Children's Bureau in planning record forms for gathering data on day-nursery and nursery-school enrollments.

The specialist in secondary education who as secretary of the Committee on Coordination in Secondary Education outlined, planned, and attended meetings and prepared minutes; collected information for a subcommittee on education of pupils of superior intelligence; arranged and carried out plans for printing a bulletin on Suggested

Studies on Education and as secretary of the Committee on Cooperative Study of Secondary School Standards planned and attended meetings and prepared the minutes; prepared a progress report, and reviewed manuscripts of three printed publications.

A conference on elementary education held at the Office of Education in June 1938 formed the basis for a second and more extensive conference attended by a number of State supervisors and directors of elementary education held at the Office in October 1938.

The first conference resulted in the raising of questions concerning current problems in elementary education, issues in curriculum, school organization and administration, and teacher education. Tentative reports on each of these are to result in a bulletin which will attempt to give a bird's-eye view of elementary education as it exists at the present time in the United States. The second conference made many of the questions of the previous group concrete and specific as conference members discussed common problems, exchanged descriptions of responsibilities of an elementary supervisor in a State department of education, and recommended to the Office of Education types of service which it might offer to persons in each of the 48 States who are responsible for the supervision of elementary education.

As a result of the conferences State supervisors and directors of elementary education organized informally for a subsequent meeting in Cleveland during the February session of the American Association of School Administrators. At that time members of the Office of Education staff who had been responsible for the first conference cooperated in carrying out the program. This informal organization will continue, and plans to suggest from time to time ways in which the Office of Education can be of assistance.

Sample books of elementary and high-school report cards were prepared and loaned to 140 committees and individuals—superintendents, principals, teachers, and college staff members in more than 30 States. Sets of stereopticon slides showing curriculum activities, school equipment, and report cards were loaned to schools and organizations.

HIGHER EDUCATION DIVISION

Activities of the Higher Education Division for the fiscal year may be briefly summarized as follows:

Four members of the staff carried forward a cooperative study in the field of accreditation of colleges and universities as carried on by State agencies. An exhaustive questionnaire was filled out for these State accrediting agencies and the materials tabulated and ana-

lyzed. One staff member visited five States in preparation for a historical study of the development of accreditation in these States. The historical development of accreditation as carried on by most of the national and regional accrediting associations was examined. The chief of the Division studied the literature dealing with problems and issues involved in accreditation and sought to discover the relation of these problems to the activities of accrediting carried on by State agencies. The authors joined in preparing a summary of findings and recommendations with respect to the best development of accreditation.

The first stage of the work of the committee on graduate study and research set up by the Commissioner of Education in 1937 was completed during the past year. President Bowman of the Johns Hopkins University completed revisions of the report which was being prepared with the help of a committee. This report deals with the basic situations underlying standards of graduate study and research in American universities and should serve as a useful guide to institutions and to educational officers seeking to maintain satisfactory graduate schools.

Work was completed on the Development of State Programs for the Certification of Teachers. This bulletin defines standards and discusses principles which should be helpful in guiding State departments of education in their efforts to improve the quality of teaching through raising the standards required for teacher certification.

The Division continued its long-time research and service project into the relation of the State to higher education. The purpose of this project is to study and develop fundamental theories and principles which may be utilized by the States in improving their present systems of higher education.

The Chief of the Division has served as adviser for the survey of higher education being carried on by the Nebraska State Planning Board for the State of Nebraska.

At the invitation of the President of the University of Arizona, assistance was given in planning for a self-survey of the university to be carried on by officers and committees of the faculty in the institution.

The Chief of the Division visited representative colleges and universities in Alabama, Arizona, California, Florida, Mississippi, North Carolina, Tennessee, and Texas, for the purpose of studying the details of their administration and instruction.

In connection with the study on graduate work and research, graduate schools of 12 universities and colleges were visited.

Thirty-five States were visited by members of the Division in connection with the cooperative study in the field of accreditation of colleges and universities.

Eight States were visited in connection with the Coordinated State Study of State Boards and Departments of Education.

The usual administrative duties have been carried on in connection with the Morrill and Supplementary Morrill funds for the land-grant colleges. Annual reports have been received, checked, and certified for the 69 land-grant colleges with respect to their expenditures of these funds.

The annual inspection of Howard University has been made by a member of the Division and the annual report compiled by the president of the University, in line with a plan approved by the Office of Education. The final report was approved and filed for use by the Congress as required by law.

COMPARATIVE EDUCATION DIVISION

The Division of Comparative Education is obligated to gather information available in any language about all levels and kinds of education outside of the United States, reassemble and reexpress it in English and distribute it within this Nation whose people are for the most part not familiar with foreign languages and have had little experience with education systems abroad.

International events during the year caused a considerable increase in the work of the Division. The flow to this country of foreigners from disturbed areas in Europe raised the number of credential evaluation from 910, in 1937-38 to 1,040 in 1938-39, even though arrangements were made with one of the large metropolitan universities to do its own evaluating. Comparative figures for some of the European countries during the past 2 years are as follows:

Country	Number of cases		Country	Number of cases	
	1937-38	1938-39		1937-38	1938-39
Austria.....	18	93	Lithuania.....	2	12
Czechoslovakia.....	19	46	Poland.....	31	53
Hungary.....	15	37	Germany.....	210	204

Interest in what other countries, especially those with totalitarian governments, are doing in education has grown considerably in the United States and brought more than the usual number of requests for information.

Help to Americans traveling abroad to study education in other countries was given in the form of letters of introduction and advice to 27 persons. Visitors from Poland, Czechoslovakia, Brazil, Turkey, England, Syria, and China came for aid in studying education in the United States.

One hundred twenty requests from students in this country for assistance in writing term papers, theses, or dissertations on some phase of comparative education were handled. They related to 33 different foreign countries and covered many different fields of education abroad such as the history of education, cost of education, physical, visual, and vocational education, illiteracy, civil service for teachers, teaching of foreign languages, education in totalitarian States, the study of optometry, and adult education, in addition to the more common and frequent demands for specific data about the usual elementary, secondary, and higher levels of instruction.

The Division advised in outlining courses in comparative education at Temple University, University of Virginia, Howard University, and the University of Georgia.

The Division completed chapter VII of volume I of Bulletin 1937, No. 2, *A Survey of a Decennium of Education in Countries Other Than the United States*; and Bulletin 1938, No. 15, *Education in Germany*.

The specialist in western European school systems returned in July of 1938 from a visit to the Netherlands and Scandinavia to study the education of teachers in those countries. The Chief of the Division gave 3½ months mainly to an investigation of education in Italy, but included as secondary purposes of the trip, visits to Egypt, Palestine, Syria, Greece, Switzerland, France, Belgium, and England where he conferred with education authorities and called at different schools, especially those maintained by American effort.

The Division of Comparative Education is not a translating agency but, in connection with its work of aiding both foreign students and collegiate admissions officers, it must of necessity translate the credentials that come to it in languages other than English. Mainly in this connection a total of 384,820 words—which amounts to about 1,540 typewritten pages—were translated during the year from 33 different languages.

As a matter of cooperation with other governmental agencies, translations amounting to 21,755 words from 12 different languages were made by the Division of Comparative Education during the year.

SPECIAL PROBLEMS DIVISION

The Division of Special Problems includes regularly established services in the fields of education of exceptional children, children in rural and sparsely settled communities, native and minority groups, including education in the Territories and insular possessions, and Negroes. Conservation education and visual aids in education are also included.

Research and investigatory activities in the assigned fields of service constitute the major responsibilities of this as of other Divisions of the Office. Not all projects under way are completed during any one year. Certain studies concerned with continuing functions of the Office, familiarity with current education practices, for example, are always in process.

The work of the specialist in the education of exceptional children was devoted in large part during the year to consideration of two phases of work in this field not previously reached, namely, the education of handicapped children in residential schools and provisions in public-school systems for socially maladjusted children. Two studies were completed during the year, both growing out of national conferences called the preceding year by the Commissioner of Education. One, a study of educational programs in residential schools, was consummated through personal visits to a number of such schools augmented by descriptive circulars and catalogs and correspondence. The report of this study describes the educational programs under way in residential schools for four types of handicapped—namely, for blind, deaf, mentally deficient, and socially maladjusted—children. The other study was an analysis of existing clinical facilities in public-school systems for the adjustment of behavior problems of school children. Another study concerned with hospital schools was revised and edited in the Division.

The work begun in the Division during the preceding year designed to assist school systems in newer curriculum developments has continued. Three studies having to do with conservation education were prepared for publication. One of these is concerned with curriculum content in conservation, one with methods of teaching conservation in the elementary schools; a third study nearing completion deals with suggestive content material and methods concerned with conduct of conservation excursions. These studies are expected to contribute substantially to the development of curriculum programs in this rapidly growing field.

The use of visual aids in the classroom is another of the newer developments concerning which school officials seek information and

guidance. During the year an informative bulletin, *School Use of Visual Aids*, containing the first survey of the extent to which school systems in the United States, classified according to size, use the different types of visual aids in their classrooms came from the press and has been widely used.

The growing demand for information concerning opportunities for the preparation of teachers in these newer fields, conservation and the use of visual aids in the classroom, led to the development of two catalog studies of such offerings in higher institutions of learning. One concerns courses offered in the use of visual aids in the classroom; the other, concerns courses in teaching conservation. Both studies give information concerning types of courses available, and type and location of institutions offering them in the several States. Teacher-education institutions desirous of introducing courses in these fields or improving those now offered need information concerning ways in which successful departments are organized and types of teaching procedures followed in other similar institutions. Demands for advisory service of all types in both these newer fields of instruction continued to increase.

Some years ago a service concerned with the education of children in outlying parts of the United States and of minority groups in the several States was established. One of the outcomes planned was the preparation of a series of reports describing the educational systems in each. During the year an addition to the series, a report on education in the Panama Canal Zone, was completed. The report includes an account of social and economic conditions among the people of the Canal Zone; a résumé of the history of provisions for education since the beginning of American occupation and a description of the present school system.

At the request of the Commissioner of Education of Puerto Rico outlines of proposed revisions in the courses of study for the schools of the island were reviewed in the Division. A memorandum was prepared concerning the proposed changes with comments and suggestions. At the request of the Committee on the Teaching of Modern Languages of the American Council on Education, information was gathered and reported concerned with textbooks issued in Spanish-speaking areas of the United States and Puerto Rico.

Studies concerned with the education of children in rural and sparsely settled communities made during the year related to the movement for improved educational facilities in elementary schools through centralized schools, and in secondary schools through curricular enrichment. One study describes ways in which centraliza-

tion of small schools is taking place and the rapidity with which larger schools are replacing one- and two-teacher schools in the 48 States and for the country as a whole. This study was completed during the year. The second study now nearing completion is concerned with curriculum offerings in small high schools. The results so far collected indicate that in spite of progress and enrichment of offerings in these schools there is need for more practical and vocational courses, more general cultural courses such as music and art, and more attention to health and leisure-time activities.

During the year one of the specialists participated in an extensive study of education in the C. C. C. camps, including field investigation, committee discussions, and the preparation of a report to the Commissioner of Education. The specialist in the education of Negroes is following up the National Survey of Vocational Education and Guidance of Negroes, recently completed.

Considerable attention has been given to preliminary planning for the proposed survey of higher education of Negroes for which Congress appropriated \$40,000 to the Office of Education. The study is to extend over a 2-year period. An advisory committee has been selected to assist in formulating objectives and in developing procedures for the study.

Field work during the year included visiting schools, including State colleges, State residential schools, hospital schools, schools organized for special purposes or for special types of children; visiting for advisory purposes State and local school systems, headquarters of educational organizations and State departments of education; and participating in State and local teachers meetings in 17 different States.

Planning and participating in conferences, both those called by the Commissioner of Education and by other agencies, are important phases of the work of the Division. During the year a conference of State directors and supervisors of special education, called by the Commissioner of Education, was planned and conducted by specialists in the Division.

A number of short bibliographies on special subjects were prepared in answer to individual requests, including phases of visual education, rural education, and special education. Three bibliographies in the Good Reference Series were completed as follows: Curriculum and Social Change; Language Handicaps of Non-English-Speaking Children; Negro Education. Mimeographed supplements to Pamphlet 71, An Annotated Bibliography on the Education and Psychology of Exceptional Children were revised.

STATISTICAL DIVISION

In order to show the national status of education, the United States Office of Education collects, compiles, and publishes statistical data for many types of public and private education. Approximately 55,000 school systems, schools, or libraries periodically receive requests for statistical information. The statistical studies which were in process in 1938-39 are shown in the following table, in which capital letter C stands for data collected; T, tabulated; and C-T, collected and tabulated within the year.

Subject of study, 1938-39	Type of study	
	Biennial	Periodic
Federal: Expenditures for education		C-T
State school systems: Personnel and finances.....	C	
City school systems:		
Personnel and finances.....	C	
Per pupil costs.....		C-T
Higher education:		
Personnel and finances.....	C	
Land-grant colleges.....		C-T
Receipts and expenditures (preliminary).....		C-T
Secondary schools:		
Staff, students, etc.....		C-T
List of accredited schools.....		C-T
Libraries, Public: Personnel and finances.....		C

LIBRARY SERVICE DIVISION

The general objective of the Library Service Division during the past year has been to further and assist development in the various fields of library service—school, college, public, and special libraries.

As a contribution toward this objective, the Division has been conducting studies which should furnish, when completed, some of the fundamental body of data so greatly needed in the attack on many problems confronting librarianship. In conjunction with the Statistical Division, it has engaged in the cooperative effort to collect comparable library statistics on a comprehensive scale. It has been preparing legal digests which should be helpful in school library and public library administration; it has participated in surveys of libraries and library conditions; and it has compiled selected bibliographies to serve as guides in book selection. In addition the Division has acted in a consultative capacity on library problems for individuals, groups, and institutions, and has assisted on numerous occasions the cause of in-service training for librarians.

Among major studies made during the year is the compilation of a list of 500 books for the preschool and elementary school children, selected and annotated to meet the constantly growing number of

requests from school librarians, supervisors, and those interested in children's work. Since the tentative list, chosen on the basis of defined criteria, was submitted to specialists in the field for criticisms and suggestions, the completed product represents the combined opinion of a group in the field as well as the judgment of the specialist in school libraries in the Office of Education.

Another bibliographic project completed was the revision of the circular *One Dollar or Less: Inexpensive Books for School Libraries*. The previous edition of this publication proved helpful to teachers, librarians, and others as a guide in selecting inexpensive but good books for children.

One member of the Division participated in an extensive survey of the University of Georgia library made by a special committee at the request of the president of that institution. This survey covered in considerable detail the administration of the library, its financial support, the quality of its book collection, the use of the library, the competency of its personnel, and in addition made specific recommendations concerning possible improvements.

The study of school library legislation in the 48 States and the District of Columbia is under way. The work is covering such points as legal provisions for the establishment and maintenance of school libraries, their administration, the requirements regarding their librarians, the relationships with other agencies, and other legal specifications.

A staff member of the Division also took part in an extensive study of public library personnel in order to prepare a classification scheme for library positions, with their respective duties and qualifications outlined, and to group municipal public libraries on the basis of certain criteria. This plan has been adopted officially by the Council of the American Library Association and is now available for use with necessary adaptations by local units.

Another research study was that on the effect of the lowered postal rates on books upon schools and libraries. At the request of the President of the United States, the Commissioner reported on the benefits of the 1½ cents per pound book rate, made possible by an Executive order signed November 1, 1938. For 5 months, data were collected from schools and libraries, showing the amount of savings in shipping charges on purchased books, and interlibrary loans, with resulting economies for the book budget. The final tabulation showed an estimated annual saving to library and school budgets of \$1,600,000, and a calculated additional use of 3,250,000 volumes. Numerous intangible benefits, such as improved and prompter service, were also indicated.

Preliminary work was done on a proposed study of unit costs of services and operations in regional libraries. Exploratory steps in this direction have been made in one of the Louisiana regional libraries, and on the basis of trials made a form for gathering the needed data has been devised. As soon as other work now pending is completed, it is proposed to formulate this study as a project, for, combined with the extensive Montclair Public Library study, it should yield for library administrators some needed data on the problem of costs in the various library processes.

At the invitation of the Commissioner of Education, State school library supervisors met on March 30-31 with the members of the Office of Education staff in Washington to discuss mutual problems and to make future plans. At the conference the supervisors pointed out the need for strengthening the elementary-school-library program, for including a school-library administration unit in the general administration courses as given in the education curriculum, and discussed the criteria for evaluating school libraries, and the essentials of good certification. The conferees also advised concerning the services which the Office of Education could render to supervisors of school libraries.

Requests for advice on library problems have been received in the Division from 38 different States, the District of Columbia, and 4 foreign countries. As examples of this kind of service rendered by the Division, the following may be noted:

Advice on classification and qualifications of the personnel in a municipal public library, and on the specifications for bookmobiles for a foundation interested in extending library service to rural schools.

Suggestions on compilation of book lists for such organizations as: The American Youth Commission, the National Congress of Parents and Teachers, the Chicago Board of Education, the Farm Security Administration, and Indian schools.

Preparation of a library promotional program for a branch of the American Association of University Women.

Advice on requirements of library science courses for a Negro college.

Advice on the effect of present copyright provisions upon libraries in the United States.

Suggestions to a New Zealand educator on rural-library problems.

Assistance on library planning programs for communities in Mississippi, Texas, Montana, New Mexico, West Virginia, Oregon, Idaho, Nebraska, and Missouri.

Among problems confronting the division, several might be singled out especially. One is the need to have on the staff specialists in college library work in order to assist librarians in that field. Changes in methods of instruction have placed new responsibilities

upon college libraries and have created problems upon which considerable research is required. It is desirable that such research be undertaken.

THE LIBRARY

The second year in the suitable new quarters of the Library saw the work progressing much more smoothly than ever before in its history. There remained but few adjustments to be made and every effort could be centered on the many projects that for years had been awaiting attention.

A number of W. P. A. workers were assigned to the Library and under supervision they performed many essential tasks that had long needed to be done. The books had never been thoroughly cleaned. One employee spent several weeks with a vacuum cleaner and put the whole collection into good condition.

Many of the older books which had been bound in sheepskin were dilapidated and in need of rebinding. As funds have been barely sufficient for the current binding, this material had never received attention. One of the W. P. A. workers knew how to repair books, and he instructed one of the others so that for several months a repair job has been in process with excellent results. Many volumes have thus been restored to usefulness.

One project which has had to wait for years for attention was the organization and listing of the textbooks in the historical collection. These books had been packed in boxes and stored, so that it was impossible to consult any of them. With the added shelf space available in the new Interior Building it has been possible to have the books unboxed, sorted, and arranged on the shelves in subject groups. A temporary worker was put on the project for 6 months full-time. She continued the listing of the textbooks on cards and practically completed the work for those published before 1875. The group of those published before 1875 consists of about 8,000 titles and covers the following categories: Arithmetic, geography, history, art, music, juvenilia, Latin, Greek, Spanish, French, science, also readers and spellers. It is hoped that it may be possible to fill many of the gaps in this valuable collection.

Through the medium of the "open exchange" plan many valuable publications which could not be had from the source of issue have been obtained. From the education collection of Harvard College Library was received a large collection of reports of State and city boards of education; also an interesting collection of catalogs of early academies and secondary schools. There was also a considerable amount of miscellaneous material which was exceedingly important

to the Library. From the Institute of International Education at Columbia University there was received much material on foreign education, including monographs, reports of foreign ministries of education, and catalogs of foreign universities.

In answer to continued requests for loan of curriculum material especially to libraries of boards of education and educational divisions of public libraries, there was started last year a duplicate collection of courses of study. This project has been successfully continued this year with the result that many courses of study have been loaned to boards of education in various parts of the country. Several boards of education have cooperated heartily in this project and have contributed two copies of all courses issued. Requests for loans addressed to these contributing boards have then been turned over to this library and the material sent from here.

The Library has also cooperated with the American Home Economics Association by becoming a depository for the archives of that association. This material will be placed in the Library and will be available for research in the field of home economics. The main collection of books and periodicals of the National Occupational Conference was sent to this Library and has been absorbed into it.

Although the use of the Library has increased greatly and the amount of work accomplished has more than doubled, there has been no increase in the number of the regular staff for the past 5 years. It would have been impossible to carry on the work since coming into the new building but for the W. P. A. workers that have been detailed to the Library.

That the Library has been used by an increasing number of people is evidenced by the following comparison of statistics of book circulation with those of the preceding fiscal year.

	1938	1939
Books borrowed.....	6,338	7,181
Books used in reading room.....	¹ 18,000	22,416

¹ Approximate.

The number of books borrowed from the Library of Congress increased from 406 in 1937-38 to 1,701 in 1938-39. This increase was largely due to the demands of the script writers in the Radio Project of the Office of Education.

In the Cataloging Division 5,883 volumes representing 3,204 titles were classified and cataloged. Twenty-eight thousand, seven hundred eighty-six cards were filed in the card catalog. Five hundred volumes classed in division "B" (psychology and religion) were re-

classified and recataloged and new cards were made. This change was made because this section of the Library of Congress classification had recently been expanded.

EDITORIAL DIVISION

Services of staff members of the Editorial Division during the fiscal year have included the editing and preparing of manuscripts for publication; issuing of *School Life*, official monthly journal of the United States Office of Education; publishing the annual educational directories; planning and conducting exhibits at major educational conventions; promoting the distribution of publications; having charge of the Office's mailing lists; issuing press releases and news letters; participating in conferences and kindred activities.

A total of 61 new publications of the Office were delivered from the Government Printing Office during the year and a total of 69 new manuscripts were completed and sent to the Printing Office for publication. In all, 1,920 requisitions for printing and binding, and other reproduction processes were handled by the Division.

Approximately 100,000 copies of *School Life* (in 10 issues, October to July inclusive) were distributed to libraries; university, college, and school administrators; teachers in practically all fields; organizations; and citizens interested in education. Four of the 10 issues contained special pictorial features which presented a bird's-eye view of educational activities in the United States. *School Life*, begun in 1918 as a 16-page publication, has grown to a 36-page journal, which each month contains latest reports on research conducted by the Office of Education, and other activities; news of education in this country and abroad; announcements of new Government publications of interest to educators; and other related material by specialists in their fields. More than 118,000 copies of reprints from *School Life* were also made available to those interested.

The Division, with the cooperation of the Higher Education and the Statistical Divisions, issued the four parts of the *Educational Directory for 1939*. Part I gives the roster of State and county school officers; part II, of city school officers; part III, of colleges and universities; and part IV, of educational associations and directories. The demand for these directories has increased to such an extent over the years, that the editions are frequently exhausted two or three months before the new edition is off the press. That was the case this fiscal year with part III.

One of the helpful ways in which the Office of Education brings to the attention of educators and to the public throughout the coun-

try the information which it gathers and disseminates is through the medium of educational exhibits. During the year this service was extended to a larger number of major education association conferences and conventions than in previous years. Office of Education exhibits were prepared upon request for many leading educational organizations including the National Education Association, American Vocational Association, American Home Economics Association, American Library Association, Association for Childhood Education, American Association for Health, Physical Education, and Recreation, and the American Association of School Administrators. Small exhibits and publications for display were sent to many other meetings.

The Office cooperated with representatives of the New York World's Fair and the Golden Gate Exposition in helping to design the educational exhibits.

News releases prepared especially for newspapers and other publications afforded another important channel through which the Office disseminated information during the year. These releases reported the high-light educational research findings published in Office of Education bulletins. They called attention to new publications issued, and revealed useful information collected by Office of Education specialists. The statements also reported Office of Education activities and services. They were sent to newspapers, news services, educational editors, special feature writers, and leaders in various fields of education throughout the United States.

In order to reach as large a number of people as possible to let them know of the availability of Office of Education publications, the Editorial Division has from time to time issued announcement leaflets of new bulletins and has utilized various other channels of publicity for this purpose.

More than 334,000 copies of Office of Education publications have been sold at nominal prices during the year by the Superintendent of Documents. More than 569,000 free copies have been issued, making a grand total of 903,000 copies.

Mailing lists for the year totaled 334 containing 186,992 addresses. These mailing lists are increased by the many requests to be placed on mailing lists, that come into the Office.

A new Handbook and Directory of the Office of Education was prepared during the year and will soon be off the press. A revised list of Office of Education publications has also been issued, covering publications from 1930 to 1939.

ALL DIVISIONS

Incoming mail to the Office of Education during the year totaled 617,143 communications, or approximately 50 percent greater than for the fiscal year 1938.

Among the great group of other agencies with which Office of Education staff members cooperated during the year in varying capacities such as service on committees, participating in conventions and conferences, writing articles, etc., were the following:

- American Council on Education.
- American Association of University Women.
- American Association of Collegiate Registrars.
- Association of American Universities.
- Institute of Administrative Officers in Institutions of Higher Education.
- National Council of Chief State School Officers.
- Society for the Promotion of Engineering Education.
- United States Employment Service.
- B'nai B'rith Vocational Service Bureau.
- Young Men's Christian Association.
- National Federation of Business and Professional Women's Clubs, Inc.
- National Vocational Guidance Association.
- American Vocational Association.
- National Education Association.
- American Youth Council.
- National Youth Administration.
- National Occupational Conference.
- United States Army.
- Works Progress Administration.
- United States Civil Service Commission.
- United States Department of Agriculture.
- United States Public Health Service.
- American Association for Advancement of Science.
- American Association of School Administrators.
- Southern Association of College and University Business Officials.
- National Temperance Council.
- West Virginia State Education Association.
- Oklahoma State Education Association.
- Association for Childhood Education.
- Progressive Education Association.
- American Library Association.
- National Congress of Parents and Teachers.
- White House Conference on Children in a Democracy.
- American Country Life Association.
- American Association on Mental Deficiency.
- American Association for Adult Education.
- American Association of Instructors of the Deaf.
- International Council on Exceptional Children.
- Association of Secondary Schools and Colleges for Negroes, and many other groups.

HEALTH AND PHYSICAL EDUCATION

In the realm of health and physical education a study concerning the selection, training, duties, and supervision of school janitors, a subject which has not been covered for some years, was completed and published under the title, "The School Custodian."

A comprehensive study of the materials and methods of instruction in hygiene was completed, as was also an investigation into the important subject of routine health examinations of school children. In conjunction with the United States Public Health Service, an introductory chapter and suggestions for teachers to be included in a publication on Communicable Diseases was prepared. The Office also cooperated with that Service in the revision of a joint publication on High Schools and Sex Education.

The consultant in hygiene served as a member of: White House Conference on Children in a Democracy; American Association of Health, Physical Education, and Recreation; Advisory Council of the Summer Round-up of the National Congress of Parents and Teachers; International Congress on Open-air Schools; American Youth Commission; American Public Health Association; National Tuberculosis Association; American Social Hygiene Association; World Federation of Education Associations; and National Conference for Cooperation in School Health Education.

A conference on health education was called by the Office, and personnel attending included State directors of health and physical education, city directors of hygiene, and superintendents of city schools.

INDUSTRIAL ARTS

During the past year considerable interest was manifested in instructional materials and methods used in shops and laboratories. The Office of Education cooperated with the International Bureau of Technical Education in a study of instructional devices conceived, planned, and constructed under the direction of teachers for use in their classes in vocational schools and in courses in physics and mechanics. The study was concerned with the extent to which such teaching devices are prepared by teachers to meet the special needs of their classes in contradistinction to standardized materials purchased from commercial firms. The Office collected the information and illustrative material on this question from a number of schools throughout the United States and forwarded it to the Bureau for compiling an international report on this subject.

Cooperation was also extended to the committee on teacher training of the American Vocational Association in planning the study of the industrial arts programs in teacher-training institutions.

From information collected from individual teacher-training institutions a list of such institutions having a department of industrial arts was compiled. An annotated bibliography on industrial arts covering recent books and periodicals was compiled.

The consultant continued to serve as secretary of the section on supervision and administration of guidance of the National Vocational Guidance Association.

TESTS AND MEASUREMENT

There was completed during the year a bulletin on Minimum Essentials of the Individual Inventory in Guidance, designed particularly for those who have not had extensive training in the use of various trait-measuring devices. The bulletin brings to bear on the problem not only the use of aptitude tests of the more formal type, but also the use of other trait records such as marks, social traits, home conditions, and the like. The bulletin emphasizes, however, the wealth of guidance values to be found in scores on tests so often used by schools, i. e., tests of achievement in subject matter, intelligence tests, and special subject prognostic tests. A study of the values of various measures for guidance purposes was made.

Advisory work in connection with the use of cumulative records has continued this year. The State cumulative record plans of Kentucky and North Carolina were studied. A field trip in this connection was made to the Kentucky State Department of Education and the University of Kentucky. The consultant has frequently conferred with the Research Division of the W. P. A. relative to the encouragement and review of projects involving the use of cumulative records.

Studies on which progress has been made during the year are: (a) A study of new methods of evaluation. This study is bringing up to date the many possibilities of measuring pupil behavior in the classroom and in the social situation. (b) Reporting to parents. This study is attacking the problem of the best ways of reporting the growth of pupils to parents so that more effective cooperation between the home and school will result. (c) A study of the validity of a typical interest questionnaire at the secondary level.

VOCATIONAL EDUCATION**NEW SERVICE ORGANIZED**

In an effort to meet new problems and needs which have arisen recently in the field of vocational education, several new services have been added during the year to the Vocational Division.

Among these is the Occupational Information and Guidance Service. A professional staff consisting of a chief of service, two specialists in occupational information, one specialist in tests, measurements, and personnel records, one specialist for consultation in field service, and one specialist for occupations for girls and women, has been provided for.

Three consultants in various fields of vocational education have been added to the staff of the Office of Education during the year: (1) A consultant in public-service training, who is responsible for conducting studies and investigations in the field of public service occupations and assists State school officers, colleges, and universities, and other organizations and groups interested in the development of vocational education, in promoting or improving programs of training in public-service occupations; (2) a consultant in employee-employer relations, whose responsibility is to make studies and investigations of problems arising from the use of Federal funds in connection with vocational training for wage-earning pursuits, and to check various training programs against special standards in order to safeguard the interests of workers and the use of public funds provided for vocational education; and (3) a consultant in curriculum problems who cooperates with Federal and State agencies in the field of vocational education on procedures and plans for the development of vocational-training programs at various educational levels, and conducts research in curriculum problems.

The name of the Commercial Education Service of the Office of Education was changed during the year to the Business Education Service as a result of the enlarged scope of its activities. In addition to administering the program of distributive education under the provisions of the George-Deen Act, the Business Education Service will continue to render advisory service and to conduct studies and investigations in all phases of business education as provided under the Smith-Hughes Act. The staff of the Business Education Service, which formerly consisted of a chief and secretary, has been enlarged to include a chief, four regional agents, and a research agent and additional secretarial help.

Because of the expanding program of vocational education and the consequent increase in the volume and complexity of administrative problems, it has been necessary to create a new position—executive assistant in vocational education—whose duties are to act as assistant to the Assistant Commissioner for Vocational Education. Several additions have been made to the personnel in already established services.

VOCATIONAL EDUCATION PROBLEMS

In reviewing the year's activities, it seems advisable to set down briefly some of the factors which those responsible for the development of vocational-education programs have been obliged to take into consideration in their efforts to further these programs.

In the field of agricultural education, for instance, it has been necessary to take into consideration the fact that vocational agriculture students have come to realize that farming is a business requiring special training, and that young farmers are aware that they must be trained to be sound financial managers, thrifty buyers, efficient producers of crops and livestock, and capable salesmen in marketing their products. There is a second factor which those responsible for agricultural education have had to consider also—that vocational education in agriculture is a continuing education program, and that it should be planned to include the education of the farm boy, in full-time classes, of young men seeking to become established in farming in part-time classes, and of adult farmers who need help in solving farming problems which continually confront them, in evening classes.

Another factor is the slowing down of the movement of surplus rural youth to the cities and to industry. This has increased the difficulty experienced by those who remain on the farm.

The higher age of entrance of young people into industrial employment has affected the work in trade and industrial education to a marked extent. Because many industries will no longer employ workers under the age of 18 years, a large number of young persons, who would otherwise be at work, remain in school. This has resulted in a marked increase in enrollment in day trade courses planned to prepare for entrance into employment.

The increasing technicality of industrial occupations has made necessary the establishment of courses which will enable workers to keep up with changing needs and requirements. Increasing interest in apprenticeship, also, has resulted in a recognition of a need for related courses in mathematics, science, drawing, blueprint reading, and other subjects related to the trade. Enactment of labor and

social legislation for workers has necessitated changes in trade and industrial schools and courses, especially those organized for employed persons.

Studies made by the States, the Office of Education, and other organizations during the past few years have served to emphasize the need for education in connection with home economics courses in money-saving skills. Such studies include those made by the National Resources Committee on the distribution of consumer incomes; those on family expenditures made by the Department of Agriculture, Bureau of Home Economics, and the Department of Labor, Bureau of Labor Statistics; and studies of these and other organizations on expenditures for housing, household operation, health, clothing, transportation, recreation, and other items.

Several factors have influenced the procedures and activities of those responsible for promoting training in the distributive occupations. Among these factors or tendencies are the following: The demand for an increasing number of workers in the service occupations; the responsibility placed upon all types of distributors to supply more accurate merchandise information to consumers, which has necessitated setting up courses on merchandise knowledge; the tendency for distributive businesses to become more professionalized as a result of the adoption of more exact management methods, thus emphasizing the need for instruction in management phases; the demand for salesmanship or selling courses which will offer instruction geared to present-day salesmanship needs; and the tendency to depend upon specific job analysis in setting up courses in distributive education.

INTEGRATION IN VOCATIONAL EDUCATION

In view of the interest manifested in recent years in the question of integration of various phases of education, the Office of Education, in cooperation with the States, has given this problem considerable attention. During the past year, what have been designated as "integration workshops" or discussions have been conducted at the University of Florida, the University of Tennessee, the University of North Carolina, and elsewhere. At these "workshops" teachers of every type of subject in the secondary school system gathered together with a view to discovering the part each phase of education plays in relation to the other and to the whole secondary education fabric.

Joint vocational training also has been resorted to in the education of adult woman workers for the dual responsibility of wage earning and homemaking, which requires cooperative effort on the part of trade and industrial home-economics-education workers.

A step toward better integration has been taken in a number of States through joint programs of training worked out by representatives of agricultural education and home-economics education.

THE FEDERAL ADVISORY BOARD

From the inception of the program of vocational education carried on under Federal grants, emphasis has been placed, first by the Federal Board for Vocational Education and more recently by the Office of Education, upon the importance of setting up advisory committees to assist in the establishment and operation of vocational education programs.

The Federal Advisory Board for Vocational Education succeeded the Federal Board for Vocational Education which was created under a provision of the Smith-Hughes Act. As at present constituted, the Federal Advisory Board for Vocational Education, which meets in the Office of Education on call of the chairman, is composed of the Secretary of Agriculture, the Secretary of Labor, the Secretary of Commerce, and the Commissioner of Education, *ex officio*; and the following lay members: Clarence Poe, editor, *The Progressive Farmer*, Raleigh, N. C., chairman and member representing agriculture; Paul H. Nystrom, president, Limited Price Variety Stores Association, New York City, member representing manufacturing and commerce; and Henry Ohl, Jr., president, Wisconsin State Federation of Labor, member representing labor.

The function of the Board is to advise the Commissioner of Education on various phases of vocational education. At its meeting held June 13, 1939, the Board gave consideration to a number of problems with which the Office of Education has been confronted during the year. It recommended, among other things, that the matter of the proposed standards for approving institutions to train teachers of vocational agriculture be referred to the joint committee of the Office of Education and the Department of Agriculture, which is working on the improvement of the curriculum standards in agricultural education, especially in the land-grant colleges; and that the Office of Education undertake the necessary studies to determine how it may encourage the various States, in cooperation with various retail and other distributive trades to make beginnings in the organization of comprehensive and well-coordinated courses of study that will aid in raising the efficiency of the distribution of goods in this country.

The Board stressed the fact that the success of the work of the Office of Education in the field of employee-employer relations, as they apply to vocational education, will depend largely upon the

functioning of advisory committees set up by State and local vocational education groups.

ADVISORY COMMITTEES

The Office of Education has set up in connection with its own program several types of advisory committees.

The Technical Advisory Committee on Trade and Industrial Education is composed of three representatives of employees, three representatives of the employer group, and three representatives from the field of vocational education. Meetings are held at the Office at least twice a year to consider current and future problems in the field of trade and industrial education and to make recommendations regarding policies and practices to be followed in establishing and maintaining training programs in this field.

As an example of the problems with which this committee concerns itself may be mentioned its consideration at one of its sessions of the application of the Wage and Hour Act on the compensation of those enrolled in cooperative part-time classes in the field of trade and industry, in an effort to arrive at a policy which could be formulated for the guidance of those responsible for vocational education programs in the States; and its consideration at a second meeting of proposed amendments to be made by Congress to the Smith-Hughes Act of 1917, under the provisions of which vocational education reimbursed from Federal grants was established in the States.

The Technical Advisory Committee on Trade and Industrial Education consists of the following persons: John P. Frey, president, metal trades department, American Federation of Labor; George L. Googe, southern representative, American Federation of Labor; Emile Rieve, president, Full Fashioned Hosiery Workers; R. O. Small, State director, vocational education, State of Massachusetts; Mrs. Betty Hawley, secretary, advisory committee on industrial education, board of education, New York City; John H. Zink, president, Heat and Power Corporation, Baltimore, Md.; B. H. Van Oot, State supervisor of industrial education, Richmond, Va.; Max Meyer, garment manufacturer, New York City; Thomas J. Thomas, vice president, Chicago, Burlington & Quincy Railroad.

Among other committees are: (1) The Advisory Committee on Vocational Training for Firemen, appointed by the Commissioner of Education during the year, consisting of members who are principally chiefs of municipal fire departments, and whose function is to advise the Commissioner of Education in regard to desirable lines of development to be followed in the field of training for fire department personnel; (2) a National Committee on Standards in Agricul-

tural Education, consisting of a State supervisor and a State teacher trainer of agricultural education from each of the four administrative regions of the country, and of which a member of the Office of Education staff is secretary and coordinator, and whose function is to lay a foundation which will enable Federal, State, and local administrators to set up standards through a national evaluation of vocational agriculture; (3) the Interdepartmental Advisory Committee on Vocational Training for the Mechanical Trades with reference to the Aviation Industries, whose function is to coordinate the efforts of the Federal departments and agencies primarily concerned with functions pertaining to vocational education for the mechanical trades, with special reference to aviation industries, including apprenticeship; (4) the Joint Committee on Relationships Between the Vocational Education Division of the Office of Education and the Agricultural Extension Service of the United States Department of Agriculture, which has been working on a program designed to coordinate country educational programs for agriculture and homemaking through the cooperation of agricultural and home economics extension agents, and vocational agriculture and home economics teachers in such a way as to remove the possibility of overlapping and duplication of effort; and (5) the committee of the American Vocational Association appointed to assist the Office of Education in the formulation of policies and to make a further study of the development of programs of agricultural education.

GROWTH OF VOCATIONAL EDUCATION

Figures submitted by the States for the year ended June 30, 1938, showed that 1,810,150 persons were enrolled in vocational education schools and classes in all fields of vocational education. This represents an increase of 313,313 over the previous year, distributed as follows: An increase of 66,476 in vocational agriculture schools, 79,592 in trade and industrial schools, 131,169 in home economics schools, and enrollments totaling 36,076 in distributive education. Present reports indicate that the enrollment figures for the year ended June 30, 1939, will materially exceed those for 1938.

Approximately 650 new departments of vocational agriculture were established in rural high schools during the past year. This increase has necessitated a corresponding increase in the number of persons being trained as teachers of vocational agriculture. The number of prospective vocational agriculture teachers who completed teacher-training courses increased from 1,237 for the year 1937 to 1,508 for the year 1938. Data show that 1,752 prospective teachers

should complete training this year and that about 1,575 will probably be placed.

It is significant that the enrollment in day trade classes, which, in the past few years, have absorbed many of those who would otherwise enroll in part-time continuation classes, has increased progressively for the past 20 years. Training in the day trade class has, in the past few years, tended to become pre-apprentice training. This is considered a desirable condition, since it helps to insure complete training for young workers and tends to limit the enrollment to the number of persons who will be needed as workers.

It is estimated that 750,000 persons were enrolled in trade and industrial classes during the year 1938-39. This exceeds by more than 100,000 the number enrolled for the year 1937-38.

Reports from the States indicate that approximately 1,500 additional home-making programs were established during the year and that the increase in enrollment in all home-economics departments for the year will approximate 75,000.

The growth during the year in the program of distributive education, provided for under the terms of the George-Deen Act of 1936, has been substantial. Unofficial data collected by members of the staff of the Business Education Service of the Office of Education, indicate that approximately 68,000 persons employed in the distributive field are enrolled in adult extension classes and 5,033 in cooperative part-time classes. During the past year, many of the distributive education classes have been organized in the smaller centers and have enrolled an increasing number of workers from small stores, a contrast with the previous year when most of the classes were organized in the larger centers, and the enrollment was composed largely of workers from the larger stores.

Twenty-six full-time and 9 part-time supervisors, assistant supervisors, teacher trainers, and research workers are now employed by State boards for vocational education in 25 States. Forty-four States have operated classes in distributive education during the year, as compared with 36 last year.

COOPERATIVE SERVICES TO THE STATES

The Federal vocational education acts expressly provide for cooperation with the States in the promotion of vocational education in agriculture, the trades and industries, home economics, and the distributive occupations. Services in these fields are rendered to the States by the Office of Education on a cooperative basis and at the request of State boards for vocational education.

Among the types of such services are the following: Assistance in perfecting plans for local programs of vocational education; participation in conferences and meetings on vocational education; preparation of material which will aid States and local communities in improving their programs; assistance in making surveys and special studies; assistance in institutes and courses for teacher trainers and teachers; and assistance in planning and improving curricula in various fields of vocational education.

Some of the principal services rendered to the States by the Vocational Division of the Office of Education during the year are reviewed under each field.

AGRICULTURAL EDUCATION

Regional conferences of supervisors and teacher trainers in the field of vocational agriculture for whites and Negroes were held under the direction of agents of the Office of Education during the year. Special stress was given in these conferences to the necessity for developing programs and formulating procedures designed to strengthen the training provisions, both technical and professional, for teachers of agriculture. Field visitations, requested by State and college officials, have been made by the agricultural teacher-training specialist of the Office to 13 teacher-training institutions preparing white teachers and to 4 institutions preparing Negro teachers, for the purpose of conducting surveys and formulating specific recommendations for the improvement of teacher training. In addition, regional agents of the Office have followed up the visits of the teacher trainer at the training institutions for the purpose of giving them assistance in adopting the recommendations of the teacher-training specialist.

Assistance was given the States in working out curriculum changes in an effort to secure greater uniformity and balance in courses of vocational agriculture, particularly between agricultural subjects and farm mechanics. Emphasis was placed upon the necessity for improving materials of instruction and for developing subject-matter materials for teachers.

The States have also been aided by the Office in developing outlines for use in promoting programs of systematic instruction for out-of-school young men and in making studies dealing with basic problems, as a means of securing authoritative information upon which to base an instructional program. State boards for vocational education have been encouraged to plan instruction for out-of-school youth on a year-around basis. As an aid to teachers in making such studies, the Office of Education issued during the year, Vocational

Monograph 20, *Discovering Occupational Opportunities for Young Men in Farming*, which shows one procedure that may be followed in making occupational opportunity studies.

With the assistance of the Office of Education, programs of research in agricultural education were formulated in 14 States.

Staff members assisted in setting up special summer schools and conferences for employed agricultural teachers, participated in 39 State conferences, served as instructors in 9 summer-school courses at teacher-training institutions, and, in the case of several States, in formulating plans for livestock-marketing schools undertaken by States in cooperation with terminal markets.

TRADE AND INDUSTRIAL EDUCATION

Included in the list of services rendered in the field of trade and industrial education may be mentioned: Making surveys to determine possible needs or opportunities for vocational courses; conducting teacher-training conferences or courses; training conference leaders; conducting conferences for groups from industry; planning courses of study for vocational schools; preparing teaching material; advising with trade and industrial-education officials regarding plans and equipment for buildings to be used for trade and industrial training; assisting in making plans to be followed in training special groups or meeting special problems; furnishing information regarding training for girls and women; assisting in the development of handicraft industries; and assisting in plans for setting up representative advisory committees in connection with trade and industrial education in the States.

The Office of Education has also devoted considerable time during the year to problems of regional and national interest in the field of trade and industrial education. Studies of occupational fields have been made and publications involving the findings of these studies prepared and published. Information about methods of dealing with specific problems of trade and industrial education and about the work done in special trade and industrial schools has been studied and distributed; and groups of persons engaged in various industries have been brought together for the discussion of training problems.

Considerable attention has been given to the development of courses for training persons employed in public service occupations and to various training problems met with in the aviation industry.

In cooperation with the Federal Committee on Apprenticeship the Office of Education has encouraged the adoption of approved apprenticeship plans, and has aided in the organization and maintenance

of educational classes in which apprentices may receive needed training in related subjects.

HOME ECONOMICS EDUCATION

In general, services to the States in the field of home economics education have included assistance in: The development of research programs; the evaluation of State programs of supervision, administration, and teacher training; and the solution of curriculum problems through guidance in committee work and planning and participating in summer sessions and various types of teacher's conferences.

The Office of Education has assisted teacher-training institutions in cooperative studies of teacher-training programs, and in putting into effect recommendations growing out of such studies.

To provide assistance in special fields of home economics education, the Office last year conducted 12 conferences as follows: Three in different sections of the country for workers concerned with graduate programs in home economics education; three regional conferences and three intraregional conferences in which a total of 439 home economics leaders participated; a conference of 43 representatives of Negro teacher-training institutions from 12 States; a meeting of members of regional committees in agricultural and home economics education concerned with planning joint programs of education for farm families; and a conference for city supervisors of home economics in cooperation with Cornell University, to consider special problems of supervision and administration of home economics in urban centers.

A survey of 14,000 secondary schools made by the Office of Education during the year is being analyzed in an effort to find out the number of junior and senior high schools offering home economics courses; the number enrolled in these courses; the percentage of girls attending these schools who are enrolled in home-economics courses; the length of class periods and the number of periods per week scheduled in home economics; the length of the home-economics course in years; the scope of the content of courses, required and elective; and the extent and type of home contacts made by teachers.

Activities of the Office in the field of the home economics curriculum during the year have included: Work with home-economics staff members in 20 colleges or universities, on college curriculum problems in 6 State conferences; assistance to curriculum committees in 6 States and in all regional conferences including a conference for Negro home-economics workers; and 18 teachers' conferences on cur-

riculum problems. Two mimeographed documents on the curriculum in home economics were prepared during the year, and a third publication, on procedures in developing curriculum materials, was in process of preparation.

BUSINESS EDUCATION

Eight different types of service have been rendered by the Office of Education in the field of business education during the year, as follows: Assistance in formulating and revising State plans for distributive education; selecting qualified persons as State supervisors and teacher trainers in distributive education; organizing a teacher-training program for the professional training of teachers of adult extension classes; formulating teacher-training programs for summer schools for the training of supervisors, coordinators, and teachers; planning courses of study for cooperative part-time classes in retailing; planning courses and selecting instructional material for adult extension classes; arranging and directing local and State-wide conferences of coordinators and teachers of distributive occupational classes; and cooperating with State boards of education in formulating and revising State courses of study in business education.

OCCUPATIONAL INFORMATION AND GUIDANCE

The Occupational Information and Guidance Service acts as a clearing house for occupational and other information. Approximately 1,000 letters a month are received by the Service requesting information. This has required the preparation of numbers of brief mimeographed and multigraphed documents, through which correspondents are directed to local sources of information or to research material.

The Service also supplies a center of coordination for the various private and public agencies which have contributions to make on problems of occupational information and guidance.

First-hand assistance in the field of occupational information and guidance has been given in answer to many requests from the States, and assistance was given in planning and carrying on a course on guidance programs at the University of Florida, which reached workers interested in the guidance field in most of the Southern States. Numerous conferences of representatives of groups whose interests are allied to the field of guidance were held in the Office of Education during the year.

The Office of Education has cooperated with State boards for vocational education by making it possible for them to initiate State programs of supervision in occupational information and guidance, under the Smith-Hughes and George-Deen Acts. Such programs vary according to local conditions, but on the whole supply the same type of service to the State and its localities as the Office supplies to the Nation and to the several States.

Within 9 months, Georgia, North Carolina, Maine, Maryland, Michigan, and Pennsylvania have set up supervisory programs of occupational information and guidance. Plans for similar services are under way in numerous other States.

Included in the year's activities was the preparation of three bulletins, one on guidance programs for rural high schools, one on minimum essentials of the individual inventory in guidance, and one on organization and administration of an occupational information and guidance service.

CONSULTING SERVICES

During the year the consultant in vocational education has cooperated with a number of States and organizations in activities connected with training for fire fighters, including the preparation of a bulletin on vocational training for firemen; with the District of Columbia in an analysis of jobs in fire-alarm bureaus; with the Federal Bureau of Prisons in developing training programs for employed prison personnel; with the Home Owners' Loan Corporation in developing in-service training for supervisors; with the Navy Department in developing in-service training for junior naval architects and marine engineers; with the Federal Bureau of Investigation, in training personnel; with various Government bureaus in preparing mimeographed publications on training for various types of work in Government services; and with the State of Washington in preparing a bulletin on training for the aircraft industry.

The consultant in employee-employer relationships has given considerable time to the working out of employee-employer problems applying to the program of vocational education in trade and industry, particularly, and has devoted attention to the problem of State and local advisory committees in connection with the setting up and operating of vocational education programs. In these activities he has cooperated closely with representatives of the American Federation of Labor and other labor organizations.

Nineteen States were visited by the consultant in public service training during the year for the purpose of advising with State

boards for vocational education or with directors or supervisors of public-service training. Services of the consultant in these States ranged from counseling on the formulation of contemplated programs and reviewing existing programs on guidance in the development of a specific short course for policemen, to consultation on the organization of a training unit in the New York Civil Service Commission.

Inasmuch as the consultant on curriculums for vocational education came to the position late in the year, no record is available on activities in that field for the period covered by this report.

COOPERATION WITH OTHER AGENCIES

The Agricultural Education Service cooperated with the Farm Credit Administration in the preparation of a series of 20 circulars on cooperative marketing, designed especially for the use of teachers of vocational agriculture. A plan for cooperative studies on agricultural financing is being developed jointly with the Federal land bank in St. Louis, which will include loans made to groups of students by production credit associations.

The Agricultural Education Service also worked with the Seventh World's Poultry Congress in planning a program which included exhibits of farm-youth activities in the poultry industry, judging contests, demonstration and enterprise contests, and entertainment features; with the Soil Conservation Service of the Department of Agriculture in setting up schools in soil-conservation practice for vocational agriculture teachers, and in preparing a bulletin on conserving farm lands; with various other divisions of the Department of Agriculture, including the Extension Service, the Bureau of Plant Industry, Bureau of Agricultural Economics, Farm Security Administration, and Agricultural Adjustment Administration, in activities represented by these divisions; with the National Youth Administration in reaching rural youth with agricultural education; with the Rural Electrification Administration in the preparation of teaching material for vocational agriculture teachers; with the United States Employment Service in finding agricultural employment for trained agriculture workers; and with the American Country Life Association, the North American Country Life Association, the North American Wild Life Conference, and the National Livestock Loss Prevention Board.

The Trade and Industrial Education Service cooperated during the year with seven governmental agencies and 15 non-Federal agencies. This Service worked with: The Civil Aeronautics Au-

thority on training facilities for aviation mechanics; the Federal Committee on Apprenticeship, on the development of apprenticeship; the United States Civil Service Commission, on training programs for Federal employees; the War Department, on training in various branches of the Army; the Interdepartmental Committee on plans for national defense; the United States Labor Department, on problems relating to employment standards; and the Forest Service, on training of field workers.

The Trade and Industrial Education Service also cooperated in various ways with the following nongovernmental agencies: American Municipal Association; American Federation of Labor; Brotherhood of Painters, Decorators, and Paperhangers; Institute of Aeronautical Science; International Association of Fire Chiefs; International Association of Fire Fighters; Bricklayers, Masons, and Plasterers International Union; National Aeronautic Association; National Association of Master Plumbers; National Occupational Conference; United Association of Journeymen Plumbers and Steamfitters; International Association of Chiefs of Police; Structural Clay Products Institute; National League of Nursing Education; and National Association of State Boards of Examiners in Cosmetology.

The Home Economics Education Service cooperated with the United States Department of Agriculture in planning for a possible survey of housing in connection with the 1940 census, in collecting illustrations of cooperation in home-economics programs, and in preparing questions to be used in conferences on the topic "Farm Family Economic Outlook for 1938-39"; with the Farm Credit Administration in the preparation of a bulletin on family credit problems; with the National Education Association in preparing a joint publication on curricular problems concerned with education for home and family living; with the Southern Association of Secondary Schools and Colleges in a study of secondary schools; with the Land-Grant College Association; American Vocational Association; the Grange; the Farmers' Union; and the American Country Life Association.

The Business Education Service has worked in close touch with representatives of distributive businesses, officers of retail associations, representatives of business educators' organizations, and members of government agencies, in the preparation of publications and in the selection of appropriate training material for programs in distributive education; in formulating training programs; in planning conferences and convention programs; and in other ways.

Included in the list of the agencies with whom the Service co-operated during the year are: The American Retail Federation, National Grocers Institute, National Association of Retail Grocers, National Retail Furniture Dealers, National Association of Retail Lumber Dealers, American Trade Association Executives, American Pharmaceutical Association, National Retail Dry Goods Association, National Canners Association, National Paint, Varnish, and Lacquer Association, National Association of Better Business Bureaus, Eastern Commercial Teachers' Association, National Commercial Teachers' Federation, the National Council of Business Education, Southern Business Education Association, the Department of Business of the National Education Association, and the Central Commercial Teachers Association.

RESEARCH ACTIVITIES

Research already under way in various fields was continued during the year and the program was expanded to include a number of new fields.

Research in the field of agricultural education has included: A national evaluation of vocational agriculture to secure information that may be used as a basis for formulating definite Federal, State, and local standards for administration, supervision, and teacher training; a study of the responsibilities and relationships of State vocational education divisions and teacher-training institutions; a study of agricultural education of less than college grade; a continuing study of teacher training in 71 institutions preparing vocational agriculture teachers, now in its third year; a study of supervision in agricultural education in States of the central region; a study of programs for out-of-school young men on farms; and a study of education in Civilian Conservation Corps camps, in cooperation with other members of a committee appointed for this purpose.

Among the studies conducted in the field of trade and industrial education are the following: Placement records of students who have been trained in federally aided trade and industrial education courses; equipment available for training workers in several trades in vocational and nonvocational schools; enrollment by ages in day trade courses; facilities—shop space, pupil capacity, qualified teachers, and value of equipment—in schools offering day trade courses; an outline of training for plumber apprentices; duties of airline hostesses; aviation training in secondary schools, colleges, and universities;

facilities for training aviation mechanics in federally aided courses; employment requirements in aviation; the formation, duties, and accomplishments of advisory committees; the duties of coordinators in part-time cooperative schools; and the work of coordination in day, part-time, and evening schools.

Research activities in the field of home-economics education have taken two forms: (1) A series of conferences with different research groups concerned with research in home-economics education, held by the agent in studies and research in 10 different States; and (2) the preparation of an illustrative series of socio-economic research abstracts bearing on home economics education. The home-economics research conferences were held with directors of graduate work and supervisors in home-economics education, and similar specialists, for the purpose of evaluating the needs for research and graduate work, determining how such programs may be set up, formulating plans for cooperation in research between State vocational divisions and teacher-training institutions, and selecting problems on which research is needed.

Studies in curriculum building in business education, including distributive education, in teacher training, and in State and local supervision were made by the Office of Education during the year. In addition, the Office has, through conference and correspondence, given assistance to individuals and groups engaged in various research studies and investigations in the field of business education, such as curriculum revision, teacher-training problems, follow-up studies, occupational surveys, job analyses, and methods of teaching business subjects.

Among other studies in vocational education on which work was done by the Office of Education during the year, also, were: One on training programs for prison officers; another on materials for the guidance of teachers of prison officer courses; and a third on analyses of prison employees' jobs.

NEW DEVELOPMENTS

Outstanding in the new developments in vocational education is the plan followed, particularly in the Southern States, of conducting joint programs in vocational agriculture and homemaking referred to in a previous section of this report.

As a result of the higher age of entrance into employment, pre-employment training, formerly planned for pupils in the 14- to 16-year-old group with elementary school training only, is now planned

for pupils who have completed all or a part of the high-school course. The enactment of wage-hour and apprentice legislation has also necessitated adjustments in part-time cooperative courses in which students spend part time in classroom instruction and the rest in practical work on the job.

The widespread adoption of new processes, the use of new materials, and the introduction of new machines and new products have resulted in the setting up of new training courses. The need for broader basic training, with the possibility of adaptation to different fields of industry, has given emphasis to technical training.

New buildings are being erected to house trade-training programs, more attention is being given to qualifications of teachers, greater efforts are being made to relate trade training to the work which pupils will be called upon to do later, and definite attempts are being made to enlist the cooperation of workers and employers in training programs.

Outstanding of the new developments in the field of home-economics education is the experiment in education for family life, sponsored by the Office of Education and started in communities in four different States. Each of the four demonstration centers is developing its program in cooperation with a large advisory committee and a smaller planning committee composed of representatives of the school system and of various community agencies and groups, in accordance with local needs and conditions. The Office of Education will make available to other communities from time to time descriptions of procedures used in these centers.

Important among new developments in the field of business education is the recognition on the part of businessmen and business educators that the traditional business course does not meet the requirements for employment. There is an imperative need, it is believed, for occupational surveys, follow-up studies, and the revision of business curricula based upon the findings of such research.

Future Farmers of America

The Future Farmers of America, composed of 205,000 members in 6,000 centers in the 48 States, Hawaii, and Puerto Rico, has taken a definite place as an agency for the improvement of agricultural conditions and country life.

In the national program of work which the organization laid down for itself this year, such projects as establishing libraries in local F. F. A. chapters, individual and cooperative thrift plans, home

improvement, rural fire prevention, conservation of natural resources, livestock loss prevention, leadership training, farm business experience, radio broadcasting by local and State units, public speaking, and camp and recreational activities were emphasized.

Among achievements of the F. F. A. during the year may be listed the holding of an intensive leadership school for national officers, preparation of a 60-foot exhibit for the World's Poultry Congress in Cleveland, Ohio, and the acquiring of a 22-acre site near Mount Vernon, Va., on which a permanent F. F. A. camp will be developed.

At the Eleventh National F. F. A. Convention held in Kansas City, Mo., October 17 to 21, 1938, the total attendance was 6,000. The National F. F. A. monthly radio program of the organization, sponsored and supervised by the Office of Education, entered its eighth year of continuous broadcasting in 1939.

New Farmers of America

The New Farmers of America is the national organization for Negro boys enrolled in vocational agriculture classes. This organization, composed of 25,000 members in 692 local chapters, carries on activities similar to those of the Future Farmers of America.

APPROPRIATIONS, 1939 AND 1940

The total amount appropriated for administering the vocational education program carried on under the provisions of the Smith-Hughes and George-Deen Acts, for the year ended June 30, 1939, was \$425,000.

In 1939 the amount appropriated under the George-Deen Act was \$12,552,068, with the provision that the allotments to the States should be computed on the basis of the total amount authorized by the act.

The acts authorizing appropriations for allotment to the States for vocational education provide that unexpended balances remaining in the States at the close of a fiscal year shall be deducted from the allotments to those States for the ensuing year. Appropriations made in consideration of the unexpended balances provide that the allotments to the States shall be made on the basis of the total amounts authorized in the acts.

Appropriations for allotment to the States and Territories for vocational education are shown in table 1, and allotments to the States and Territories in table 2.

TABLE 1.—Appropriations for Allotment to the States and Territories for Vocational Education 1939, 1940

Act	Appropriation	
	Fiscal year ended June 30, 1939	Fiscal year ending June 30, 1940
VOCATIONAL EDUCATION		
Smith-Hughes Act:		
Total.....	¹ \$7, 167, 000	¹ \$7, 167, 000
Vocational agriculture.....	3, 027, 000	3, 027, 000
Vocational trade, industry, and home economics.....	3, 050, 000	3, 050, 000
Vocational teacher-training.....	1, 090, 000	1, 090, 000
George-Deen Act:		
Total.....	² 12, 552, 068	¹ 13, 750, 000
Vocational agriculture.....	3, 696, 530	3, 920, 000
Vocational trade and industry.....	3, 647, 183	3, 990, 000
Vocational home economics.....	3, 731, 531	3, 920, 000
Distributive occupations.....	624, 542	940, 000
Vocational teacher training.....	852, 282	980, 000
An act making appropriations for the Territory of Hawaii:		
Total.....	30, 000	30, 000
Vocational agriculture.....	10, 000	10, 000
Vocational trade, industry, and home economics.....	10, 000	10, 000
Vocational teacher training.....	10, 000	10, 000
An act making appropriations for the island of Puerto Rico:		
Total.....	105, 000	105, 000
Vocational agriculture.....	30, 000	30, 000
Vocational trade and industry.....	30, 000	30, 000
Vocational home economics.....	30, 000	30, 000
Vocational teacher-training.....	15, 000	15, 000
Total.....	19, 854, 068	21, 052, 000

¹ Permanent and continuing appropriation. Estimated expenditure \$7,000,000.² Allotments to States made on basis of \$14,483,000 as authorized in the act.

TABLE 2.—Allotments of Federal Money to the States and Territories for Vocational Education for Each Fiscal Year, 1938 to 1941, Inclusive 1

State or Territory	Smith-Hughes funds (appropriated)				George-Deen funds (authorized to be appropriated)					
	Total	Agriculture: For salaries of teachers, supervisors, and directors	Trade, indus- try, and home economics: For salaries of teachers	Teacher train- ing: For sala- ries of teachers and mainte- nance of teacher train- ing	Total	For agri- cultural education	For trade and industrial education	For home economics education	For dis- tributive occupations	For teacher training
Total.....	\$27,157,977.62	\$23,018,853.83	\$2,83,049,265.27	\$21,089,858.52	\$314,483,000.00	\$4,067,200.00	\$4,058,975.00	\$4,048,825.00	\$1,251,000.00	\$1,054,000.00
Alabama.....	160,268.82	106,018.23	32,611.15	21,639.44	401,144.05	165,947.24	55,072.91	135,856.98	24,429.46	19,837.46
Arizona.....	35,926.19	15,926.19	10,000.00	10,000.00	80,408.60	20,000.00	20,000.00	20,408.60	10,000.00	10,000.00
Arkansas.....	113,969.95	82,028.87	16,776.23	15,164.85	305,740.84	138,697.14	30,995.77	105,115.82	17,120.09	13,902.02
California.....	313,266.41	84,540.06	182,301.17	46,425.18	493,375.58	76,828.34	213,243.37	108,333.79	52,410.87	42,559.21
Colorado.....	61,536.56	28,757.35	22,779.21	10,000.00	123,622.04	35,018.40	31,752.56	36,851.08	10,000.00	10,000.00
Connecticut.....	89,214.52	26,484.45	49,589.77	13,130.30	144,923.17	20,000.00	64,104.14	33,938.47	14,831.50	12,046.06
Delaware.....	30,900.00	10,000.00	10,000.00	10,000.00	80,000.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Florida.....	84,785.54	39,488.86	33,290.52	12,006.16	159,855.59	34,542.21	50,149.93	50,602.96	13,551.13	11,006.36
Georgia.....	175,228.68	112,207.67	39,236.98	23,784.03	430,909.73	175,634.20	62,833.09	143,788.43	26,850.55	21,803.46
Idaho.....	37,587.72	17,587.72	10,000.00	10,000.00	85,800.29	23,322.53	20,000.00	22,537.76	10,000.00	10,000.00
Illinois.....	420,534.11	111,199.48	246,935.68	62,398.95	673,513.00	123,732.64	279,646.92	142,496.48	70,444.17	57,202.79
Indiana.....	185,584.34	80,412.77	78,689.02	26,482.55	360,165.48	100,662.97	102,283.38	103,044.87	29,897.00	24,277.26
Iowa.....	83,146.09	42,908.77	20,205.87	15,381.69	331,923.17	121,080.05	62,961.33	106,547.48	22,811.05	18,523.26
Kansas.....	146,201.73	64,167.24	31,978.49	15,381.69	250,754.04	87,561.92	49,499.38	82,227.05	17,364.88	14,100.81
Kentucky.....	157,592.42	101,201.53	35,010.22	21,380.55	379,172.33	145,672.06	60,643.33	129,684.62	24,137.19	19,600.13
Louisiana.....	124,390.87	70,683.15	36,522.14	17,185.58	282,172.30	102,842.00	53,597.61	90,576.86	19,401.35	15,754.48
Maine.....	50,613.30	26,528.15	14,087.15	10,000.00	101,582.84	21,171.85	26,416.52	33,994.47	10,000.00	10,000.00
Maryland.....	92,639.43	36,602.80	42,714.98	13,341.65	162,385.90	29,400.76	58,788.05	46,904.63	15,061.81	12,230.65
Massachusetts.....	225,939.31	23,310.27	167,878.22	34,750.82	294,988.15	20,000.00	174,008.92	29,870.92	39,231.31	31,857.00
Michigan.....	270,137.03	85,855.27	144,684.11	39,597.65	459,102.70	96,872.60	171,207.64	110,019.17	44,703.05	36,300.23
Minnesota.....	148,887.03	72,816.70	55,103.85	20,966.48	317,424.54	110,858.20	70,365.18	93,310.90	23,669.73	19,220.53
Mississippi.....	124,424.02	93,141.81	14,847.09	16,435.12	349,001.51	168,741.26	27,283.12	119,356.49	18,554.13	15,066.51
Missouri.....	269,813.81	98,675.62	81,459.38	29,678.81	431,203.86	137,990.54	106,052.83	125,467.79	33,505.35	27,207.35
Montana.....	33,875.61	19,875.61	10,000.00	10,000.00	90,801.51	25,331.93	20,000.00	25,469.58	10,000.00	10,000.00
Nebraska.....	32,280.54	49,713.06	21,299.32	11,268.16	192,684.27	72,518.94	33,409.76	63,704.76	12,720.99	10,329.82
Nevada.....	30,000.00	10,000.00	10,000.00	10,000.00	89,000.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
New Hampshire.....	32,679.49	10,714.23	11,965.26	10,000.00	89,000.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
New Jersey.....	218,493.63	39,135.29	146,312.71	33,047.63	302,649.11	20,000.00	164,895.07	50,149.88	37,308.52	30,295.64
New Mexico.....	37,642.12	17,642.12	10,000.00	10,000.00	82,607.48	20,000.00	20,000.00	20,000.00	22,607.48	20,000.00
New York.....	679,136.35	115,167.53	461,031.10	102,937.72	947,775.39	89,138.46	500,480.36	147,581.33	116,209.68	94,365.76
North Carolina.....	192,981.96	131,572.08	35,484.35	25,924.63	485,954.01	198,094.85	66,222.13	168,604.08	29,267.13	23,705.80
North Dakota.....	51,632.26	31,635.26	10,000.00	10,000.00	129,730.19	49,191.21	20,000.00	40,598.98	10,000.00	10,000.00
Ohio.....	371,096.69	119,248.45	197,495.50	54,352.74	627,013.40	125,453.59	237,593.83	152,810.82	61,360.55	49,826.61
Oklahoma.....	144,352.81	87,756.55	36,002.87	19,593.39	337,188.40	126,795.87	57,856.10	112,455.55	22,119.60	17,961.78
Oregon.....	57,324.88	25,866.11	21,438.77	10,000.00	111,628.76	27,693.47	30,789.18	33,146.11	10,000.00	10,000.00

Pennsylvania.....	537,709.58	172,677.04	286,273.69	78,759.45	858,491.92	106,072.11	370,028.00	221,276.85	88,914.06	72,200.90
Rhode Island.....	47,842.03	10,000.00	27,842.03	10,000.00	88,296.97	20,000.00	28,296.97	20,000.00	10,000.00	10,000.00
South Carolina.....	106,714.19	76,236.31	16,259.29	14,218.59	274,928.97	113,473.43	34,676.21	97,692.95	16,031.82	13,034.56
South Dakota.....	51,325.28	31,325.28	10,000.00	10,000.00	128,452.67	48,313.48	20,000.00	40,139.19	10,000.00	10,000.00
Tennessee.....	156,555.22	95,875.76	39,282.82	21,396.64	376,206.74	150,491.95	59,084.08	122,859.89	24,155.35	19,614.87
Texas.....	343,814.26	191,491.24	104,691.96	47,631.06	780,504.42	291,248.04	146,433.22	245,386.28	53,772.22	43,664.66
Utah.....	35,132.76	13,466.11	11,666.65	10,000.00	80,000.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Vermont.....	33,424.97	13,424.97	10,000.00	10,000.00	80,000.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Virginia.....	145,433.63	91,269.99	34,419.18	19,804.46	337,148.87	117,718.58	62,036.16	116,880.97	22,357.89	18,153.27
Washington.....	80,381.85	37,840.26	38,757.07	12,784.52	165,452.09	37,731.20	53,077.76	48,490.36	14,462.86	11,719.91
West Virginia.....	104,667.06	68,990.85	21,535.80	14,140.41	226,923.60	55,607.33	53,981.55	88,408.27	13,963.56	12,962.89
Wisconsin.....	169,327.36	77,210.55	68,083.37	24,033.44	343,977.87	109,088.23	86,784.01	98,941.39	27,132.12	22,032.10
Wyoming.....	30,000.00	10,000.00	10,000.00	10,000.00	80,000.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Alaska.....	30,000.00	10,000.00	10,000.00	10,000.00	80,000.00	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Hawaii.....	105,000.00	30,000.00	60,000.00	15,000.00	80,020.99	20,020.99	20,000.00	20,000.00	10,000.00	10,000.00
Puerto Rico.....					254,271.99	126,739.41	21,941.06	79,764.66	14,253.00	11,573.86
District of Columbia.....					80,512.97	20,000.00	20,512.97	20,000.00	10,000.00	10,000.00

¹ Allotments based on United States census returns of population in 1930. For the years 1942 to 1951, inclusive, allotments will be based upon returns of population in 1940.

² The allotments to Hawaii and Puerto Rico are not included in the totals under the Smith-Hughes Act.

³ The sum of \$13,750,000 was appropriated for the fiscal year 1940, with the proviso that the allotments to the States and Territories be made on the basis of \$14,483,000, the full amount authorized.

VOCATIONAL REHABILITATION

During the fiscal year plans were consummated for the establishment of a program of vocational rehabilitation in the State of Delaware, whose legislature at its 1939 session accepted the provisions of the Federal Rehabilitation Act.

Thus the 48 States, the Territory of Hawaii, the island of Puerto Rico, and the District of Columbia have enacted rehabilitation legislation. All of them with the exception of Kansas now have a program of rehabilitation in operation. Plans were initiated during the year whereby funds will be made available from public sources other than the State legislature to initiate a program in Kansas.

Under Federal acts the Congress is authorized to appropriate \$1,938,000 annually for the maintenance of rehabilitation programs in the States. This amount was made available to the States during the fiscal year 1939. The allotments of Federal money to the States and Territories for vocational rehabilitation for the fiscal years ending June 30, 1939 and 1940, are shown in table 1.

The Federal act for promotion of service to the blind does not authorize a specific appropriation, nor does it provide for Federal aid to the States in carrying out the program outlined in the act. However, the Congress made available to the Office about \$23,000 for administration of the act, and the maintenance of the program in the States is financed by State appropriations and contributions from agencies interested in the rehabilitation of the blind.

The number of disabled persons rehabilitated—that is, restored physically where possible, trained where necessary, and placed in remunerative employment—during the fiscal year ended June 30, 1938, was 9,725. No figures on the number of cases rehabilitated during the fiscal year ended June 30, 1939, are yet available. However, information from the States and Territories indicates that the number may even exceed the number rehabilitated during the preceding year.

IMPROVEMENT AND EXPANSION

There are many indications of a growing interest on the part of State rehabilitation officials in the improvement and expansion of their programs for rehabilitation of special groups, such as the deaf and hard of hearing and those disabled through tuberculosis and heart diseases. In several States cooperative programs for providing services to these groups have been established.

During the year there was a material growth in service for the blind in the 39 States cooperating in this movement, in Hawaii, and

in the District of Columbia. Two hundred and fifty blind persons were established in vending stands in Federal buildings, and about 500 in other buildings.

DIFFERENT SERVICES

The services of the Rehabilitation Division fall in two categories: First, specific services to State officials; and, second, general research activities. Included in the specific services are assistance in the training of new personnel, organizing working relations with welfare agencies other than rehabilitation agencies, improving statistical and financial record systems, improving case service records, reorganizing State programs, and in extending State programs in local communities.

An important phase of the research activities of the Rehabilitation Division staff was the making of surveys of State rehabilitation programs. Reports on surveys include specific recommendations for the improvement of the State programs. The findings of the surveys are in each instance discussed with State rehabilitation officials, and assistance is given them in effecting the recommendations contained in the survey report.

Members of the research service of the Rehabilitation Division were engaged during the year in the preparation of a series of monographs dealing with approved techniques in rehabilitation case work; in a study of the feasibility of rehabilitation of persons handicapped through tuberculosis; in a study of the post-rehabilitation experiences of cases rehabilitated in the fiscal year ended June 30, 1936, to determine their present employment status and the substantiality of the rehabilitation service rendered them; and in a study of the success factors in training disabled persons in commercial and industrial establishments.

CORRELATION WITH OTHER SERVICES

The rehabilitation services in the States cooperate with State agencies engaged in the administration of accident compensation, public employment service, and service for crippled children. During the year the Rehabilitation Division assisted the States in the formulation of agreements of cooperation with these agencies and in the establishment of effective working relations.

The Social Security and Fair Labor Standards Acts materially affect the conditions under which disabled persons are employed. Under the Social Security Act, moreover, the physically handicapped

are entitled to benefits. It provides pensions for the blind, aid to dependent children, and health service. In order that a State rehabilitation service may best serve the physically disabled, it must work in close cooperation with unemployment compensation, public assistance, health, and welfare service. During the year the staff aided the States in initiating plans for correlating their services with the agencies here enumerated.

The extension of benefits under the social security program has resulted in the reference of larger numbers of disabled persons to State rehabilitation departments. One of the effects of this larger referral of cases is the recognition of the need of many handicapped persons for special types of service leading to their vocational adjustment. If these needs are to be met by the State rehabilitation services, some liberalization of policy will be necessary. Rehabilitation is now making a study of these needs in order to determine what action should be taken to assist the States in meeting these new problems.

The tables which follow show the amount of Federal money now available to the States and Territories for rehabilitation purposes.

APPROPRIATIONS, 1939 AND 1940

Allotments of Federal money to the States and Territories for vocational rehabilitation for the fiscal years ending June 30, 1939, and 1940, as shown by table 2, amounted to \$1,938,000. This does not include, however, a special allotment of \$5,000 to Hawaii and allotments of \$25,000 and \$15,000, respectively, to the District of Columbia and Puerto Rico.

TABLE 1.—Appropriations for Allotment to the States and Territories for Vocational Rehabilitation 1939, 1940

Act	Appropriation	
	Fiscal year ended June 30, 1939	Fiscal year ending June 30, 1940
Vocational Rehabilitation Act:		
Total.....	¹ \$1, 800, 000	¹ \$1, 800, 000
Hawaii.....	5, 000	5, 000
Puerto Rico.....	15, 000	15, 000
District of Columbia.....	25, 000	25, 000
Total, vocational rehabilitation.....	1, 845, 000	1, 845, 000

¹ Allotments to States made on basis of \$1,938,000, as authorized in the act.

TABLE 2.—Allotments of Federal Money to the States and Territories for Vocational Rehabilitation, Fiscal Years Ending June 30, 1939, and 1940

State or Territory	Amount	State or Territory	Amount
Total.....	\$1,938,000.00	Nevada.....	\$10,000.00
Alabama.....	40,912.77	New Hampshire.....	10,000.00
Arizona.....	10,000.00	New Jersey.....	62,481.73
Arkansas.....	28,671.54	New Mexico.....	10,000.00
California.....	87,774.11	New York.....	194,619.94
Colorado.....	16,014.02	North Carolina.....	49,014.59
Connecticut.....	24,843.80	North Dakota.....	10,526.32
Delaware.....	10,000.00	Ohio.....	102,762.39
Florida.....	22,699.53	Oklahoma.....	37,044.38
Georgia.....	44,967.45	Oregon.....	14,746.17
Idaho.....	10,000.00	Pennsylvania.....	148,907.13
Illinois.....	117,975.03	Rhode Island.....	10,629.16
Indiana.....	50,069.43	South Carolina.....	26,882.47
Iowa.....	38,202.37	South Dakota.....	10,711.91
Kansas.....	29,081.51	Tennessee.....	40,453.71
Kentucky.....	40,423.30	Texas.....	90,054.00
Louisiana.....	32,492.04	Utah.....	10,000.00
Maine.....	12,328.69	Vermont.....	10,000.00
Maryland.....	25,224.49	Virginia.....	37,443.44
Massachusetts.....	65,701.88	Washington.....	24,171.15
Michigan.....	74,865.59	West Virginia.....	26,734.67
Minnesota.....	39,640.43	Wisconsin.....	45,439.00
Mississippi.....	31,073.18	Wyoming.....	10,000.00
Missouri.....	56,112.45	District of Columbia.....	25,000.00
Montana.....	10,000.00	Hawaii.....	10,000.00
Nebraska.....	21,304.23	Puerto Rico.....	15,000.00

¹ A special allotment of \$5,000 to Hawaii and the allotments to the District of Columbia and the island of Puerto Rico are not included in the total.

EDUCATIONAL ACTIVITIES IN C. C. C. CAMPS

(Junior Companies Only)

In his message to Congress recommending the transfer of the Civilian Conservation Corps to the Federal Security Agency, the President once again stressed the social and educational aspects of the organization. He said in part, "The Civilian Conservation Corps, now an independent establishment, is placed under the Federal Security Agency, because of the fact that its major purpose is to promote the welfare and further the training of the individuals who make up the corps, important as may be the construction work which they have carried on so successfully. * * * This transfer would not interfere with the plan of work heretofore carried on, but it would enable the Civilian Conservation Corps to coordinate its policies, as well as its operations, with those other agencies of the Government concerned with the educational and health activities and with human security."

This statement again indicates the unique character of the C.C.C. as an educational agency. Every phase of camp life contributes to the employability and civic usefulness of the young men enrolled in the corps. The routine and discipline of camp life, the hours of

work in the open air, the good food, regular hours, and association with the supervisory personnel assist immeasurably in the development of the enrollees.

Aside from these intangible values, however, a great variety of organized educational activities are carried on in the camps. These include counseling and guidance, academic education, vocational and job training, informal educational activities, and other courses such as health, first aid, safety, lifesaving, and professional training for instructors and enrollee leaders.

A few of the outstanding achievements of the year are as follows:

The average strength of the corps was 275,572 enrollees, and the average regular attendance in organized classes and activities was 249,768 enrollees, or 91.5 percent of the average strength.

The reports indicate that the average enrollee spent slightly more than 4 hours each week in his educational activities.

Thirty-seven percent of all enrollees participated in academic classes; 47 percent in vocational classes; 65 percent in job-training activities; 16 percent in informal activities; 13 percent in professional training; and 59 percent in such classes as first aid, safety, health, and life saving.

A total of 8,445 enrollees who entered the corps illiterate were taught to read and write during the year.

Five thousand one hundred and forty-six enrollees completed the elementary grades and received eighth-grade diplomas; 1,048 received high-school diplomas; and 96 received college degrees.

One hundred and three thousand nine hundred and thirty-nine enrollees were awarded 174,277 C.C.C. unit certificates; 15,150 were awarded 17,096 C.C.C. educational certificates; and 23,836 were awarded 26,691 C.C.C. proficiency certificates.

One million five hundred and thirty thousand six hundred and seventy-three guidance interviews were held by C.C.C. officials during the year.

There was an average of 24,476 instructors, or 16 per camp, each month.

An average of 6,203 educational films were shown each month with a monthly attendance of 503,566; 7,320 lectures were given during an average month, with a monthly attendance of 960,379.

Thirty-one thousand and eight enrollees were discharged to accept employment during the year. Many of these men were assisted in qualifying for and finding their jobs through their participation in the educational program.

The Enrollees

The age of junior enrollees ranges from 17 to 23, the average being about 20 years. Forty-four percent of the men had never been employed or were only occasionally employed prior to their enrollment in the corps. An additional 23 percent had been unemployed for a period ranging from 7 months to more than 3 years. Thirty-three percent had been unemployed for 6 months or less. The following table gives these figures in detail:

TABLE 1.—Length of Unemployment of Junior C. C. C. Enrollees (Data as of May 31, 1939)

Length of unemployment	Number of enrollees	Percentage
Never employed.....	78,435	30.6
Intermittently employed.....	34,722	13.6
Less than 2 months.....	33,854	13.2
2 to 6 months.....	49,753	19.4
7 to 12 months.....	32,125	12.5
13 to 24 months.....	16,530	6.5
25 to 36 months.....	6,118	2.4
More than 3 years.....	4,554	1.8
Total.....	256,091	100.0

Thirty-one percent of the junior enrollees come from farms, 23 percent from rural nonfarm areas, and 46 percent from urban sections. In educational level the enrollees range from illiterates to college graduates. The average member dropped out of school in the eighth grade.

TABLE 2.—Educational Level of Enrollees Prior to Joining C. C. C. (Data as of May 31, 1939)

Completed school grade	Number enrollees	Percentage	Completed school grade	Number enrollees	Percentage
None.....	933	.4	Tenth grade.....	31,777	12.4
First grade.....	1,316	.5	Eleventh grade.....	19,915	7.8
Second grade.....	2,409	.9	Twelfth grade.....	32,012	12.5
Third grade.....	4,721	1.8	First year college.....	2,225	.9
Fourth grade.....	8,020	3.1	Second year college.....	704	.3
Fifth grade.....	11,754	4.6	Third year college.....	137	.1
Sixth grade.....	19,026	7.4	Fourth year college.....	67	
Seventh grade.....	32,772	12.8	Over 4 years college.....	9	
Eighth grade.....	53,857	21.0	Total.....	256,091	100.0
Ninth grade.....	34,437	13.5			

The Guidance Program

From the beginning of the C.C.C. educational program, guidance has been considered the major educational activity. The typical young man who enters the C.C.C. is barely 20 years of age. He had left school when he was in the eighth grade. He has had little

or no work experience and may be bewildered and disheartened by his futile efforts to secure a job. He has had little if any vocational training and has received practically no vocational guidance. Because of his unfortunate experiences, he may be apathetic and indifferent or perhaps embittered in his attitudes. Many of the men leaving their homes for the first time are homesick and skeptical of the opportunities awaiting them.

When he enters camp he is subjected to a score of new influences. Work, play, study, the routine and discipline of camp life, association with his fellows, and contacts with the supervisory personnel—all contribute to his development. He must be guided, however, if he is to secure the maximum benefits from these experiences.

The guidance procedure begins with the selection and enrollment of the enrollee. Only those enrollees are selected who are in need of employment and who demonstrate their physical and mental ability to profit from the experience in the camp.

In general, the guidance program includes an orientation program to adjust the new men to camp life; a systematic counseling program carried on by the educational adviser and other qualified members of the supervisory personnel; the assignment of the men to work and educational activities in accordance with their needs, interests, and abilities; a periodic evaluation of their progress; and an attempt to place the men in jobs and follow them up after their discharge from the corps to assist in their readjustment.

General Education

During the past year 91.3 percent of the enrollees regularly attended educational classes during their leisure time. The average enrollee spent about 4 hours each week in this way.

Two of the major objectives of the C.C.C. educational program are to eliminate illiteracy and to raise the educational level of enrollees deficient in school subjects. To accomplish this, elementary, high school, and college courses are offered to enrollees in the camps. During an average month, 102,138 enrollees, or 37.4 percent of the men, regularly attended academic courses.

There were 7,415 illiterates in the camps during an average month and 7,224 (97.4 percent) attended literacy courses. 8,445 illiterate enrollees were taught to read and write during the year. 92,068 enrollees were on the elementary level and of these 48,876 (53.1 percent) took elementary courses. 5,146 were awarded eighth-grade certificates as a result of their work. 138,347 enrollees were on the

high-school level and 47,229 (34.1 percent) of these men attended high-school courses. 1,048 were awarded high-school diplomas. 35,743 were on the college level, and 2,268 (6.3 percent) attended college classes during the year. 96 received college degrees. In addition, a report for the period from July 1 to October 15, 1938, indicated that during this 3½ months' period, 763 scholarships were established for enrollees by 189 different colleges and other institutions.

Elementary Curriculum

A study was made of the academic curriculum of the C. C. C. during the year. It was discovered that, although 86 different-named elementary subjects were offered in the camps, 97 percent of the enrollees attended classes in 9 different subjects, including literacy training, grammar, penmanship, reading, spelling, arithmetic, civics, geography, and history.

Vocational Training

Vocational training is considered one of the major objectives of the program, and 49.5 percent of the educational activities are classified as having vocational objectives. It is necessary to train the men for the jobs which they are called upon to perform in the camps, and further, to train them for jobs which they may secure upon their discharge from the C. C. C. Job training is an important part of the educational and training program.

A study made of the vocational curriculum revealed that 249 different vocational subjects were being taught in the camps. However, 71 percent of the men were enrolled in 21 major courses, which included bookkeeping, shorthand, typing, office practice, business management, electricity, house wiring, radio service, carpentry, masonry, cabinetmaking, general agriculture, soil conservation, forestry, auto mechanics, blacksmithing, welding, retail merchandising, surveying, and drafting. Instructional outlines in these and a few additional subjects are now being prepared for use in the camps.

The extent of participation of enrollees in job training and vocational courses is shown in the following tabulation:

Enrollee Participation in Job Training and Vocational Courses

Average number enrollees attending job training courses.....	178, 918
Average number enrollees attending vocational courses.....	127, 383

A feature of the C. C. C. educational program is the emphasis placed upon informal types of education, such as arts and crafts,

dramatics, and music. The reports indicate that 16 percent of the men engaged in these activities during the past year.

There is a variety of other educational activities carried on. All camps provide instruction in health, first aid, and safety. Officers, foremen, enrollees, and other instructors in most camps attend foremanship classes, leader training, and teacher training groups. Eighty-seven thousand eight hundred and forty-two lectures were delivered in the camps during the year, and 74,435 educational films were shown. The average monthly circulation of books from the camp library amounted to 192,324, with 39.5 percent of the enrollees borrowing the books. An average of 6,665 enrollees attended schools and colleges in the vicinity of the camps, and 17,695 took correspondence courses. An average of 865 companies published camp newspapers each month.

Teaching Staff

The teaching staff of the C. C. C. educational program is drawn largely from the personnel in each camp. For example, during an average month there were 24,476 persons acting as instructors in the camps. Of this number, 1,446 were camp educational advisers; 3,029 were Army officers; 9,953 were members of the technical services; 6,410 were enrollees; 1,745 were W. P. A. instructors; 66 were N. Y. A. student teachers; 1,098 were teachers from the local school system; and 726 were volunteer instructors from nearby communities.

Cooperating Agencies

Much of the success of the C. C. C. educational program has been due to the cooperation of four major departments of the Federal Government—Labor, War, Interior, and Agriculture. In addition, State, local, and private educational organizations and other agencies have assisted greatly in the development of the program. The Works Progress Administration made available an average of 1,745 instructors per month and the National Youth Administration an additional 66. State and local educational institutions provided an average of 1,098 instructors each month. One hundred and eighty-nine colleges and other institutions offered scholarships to enrollees and more than 60 provided correspondence courses at reduced rates for the enrollees. Hundreds of other schools and colleges have placed their facilities at the service of enrollees during the school year. Likewise, other nongovernment agencies, such as the Chamber of Commerce, Junior Chamber of Commerce, Y. M. C. A., Kiwanis, and Rotarians, have aided in training the men and placing them in employment.

OFFICE OF EDUCATION PUBLICATIONS—ALL DIVISIONS

(Completed for Printing During the Fiscal Year 1939)

Bulletins

1937 No.

2. Biennial survey of education, 1934-36.
Vol. I, chapter I. Elementary education, 1930-36.
Vol. II, chapter I. Statistical summary of education, 1935-36.
29. Are the one-teacher schools passing?

1938 No.

13. Statistics of the education of Negroes.
15. Education in Germany.
16. Accredited higher institutions, 1938.
17. Hospital schools in the United States.

1939 No.

1. Educational directory, 1939.
Part
I. State and county school officers.
II. City school officers.
III. Colleges and universities.
IV. Educational associations and directories.
2. Accredited secondary schools in the United States.
3. Higher educational institutions in the scheme of State government.
4. The school auditorium as a theater.
5. Bibliography of research studies in education 1937-38.
6. Education in Yugoslavia.
7. Individual guidance in a C. C. C. camp.
8. Public education in the Panama Canal Zone.
9. Residential schools for handicapped children.
10. The graduate school in American democracy.
11. 500 books for children.
12. The warp and woof of health instruction.

1940 No.

15. Clinical organization for child guidance within the schools.
16. A review of educational legislation, 1937 and 1938.

Miscellany

3. Education in the United States of America.
4. La Educación en los Estados Unidos de America.
A Educação nos Estados Unidos da America.
School Life index, volume XXIII.
Handbook and directory of the Office of Education, 1939.

Pamphlets

86. Per pupil costs in city schools, 1937-38.
87. Parent education programs in city school systems.
88. One dollar or less—Inexpensive books for school libraries.

Leaflets

14. Pharmacy. Revised.
29. Textbook expenditures in large city school systems, 1932, 1934, and 1936.
31. Government publications of use to teachers of geography and science.

47. Know your board of education.
48. Know your superintendent.
49. Know your school principal.
50. Know your teacher.
51. Know your school child.
52. Know your modern elementary school.
53. Know how your schools are financed.
54. Federal funds for education, 1937-38.

Bibliographies

23. Language handicaps of non-English-speaking children. Revised.
29. The curriculum and social change. Revised.
35. Visual aids in education: Research studies.
38. The elementary-school principal.
47. Fiction portraying home life and family relationships.
58. Music instruction.
59. Art instruction.
69. Mental hygiene at home and at school.

Vocational Education Bulletins

13. Agricultural education—Organization and administration. Revised.
198. Conference topics for the retail grocery business.
199. Vocational training for firemen.
200. Related instruction for plumber apprentices.
201. Conserving farm lands.
202. Minimum essentials of the individual inventory in guidance.
203. Guidance programs for rural high schools.
204. Occupational information and guidance—Organization and administration.
205. Cooperative part-time retail training programs.
206. Credit problems of families.

Monographs

19. Agricultural education programs.
20. Discovering occupational opportunities for young men in farming.

Leaflets

1. Teaching the control of black stem rust of small grains in vocational agriculture classes. Revised.
3. Teaching the control of loose smuts of wheat and barley in vocational agriculture classes. Revised.
4. Teaching the grading of feeder and stocker steers in vocational agriculture classes. Revised.
6. Instruction in poultry in secondary schools.

CIVILIAN CONSERVATION CORPS

Language Usage Series

- Camp life reader and workbook No. 1.
- Camp life reader and workbook No. 2.

GEOLOGICAL SURVEY

W. C. Mendenhall, *Director*

ESTABLISHED in 1879, the Geological Survey has now rounded out threescore years of service. Its objective has always been the practical application of science to the public welfare. It has endeavored to maintain high standards of professional work, to make steady contributions to the advance of knowledge within its assigned fields, and to apply this knowledge in the mineral industry, in cartography, and in hydrography. Since its establishment it has published many thousands of reports and maps, thus making available for general use the results of its work in geology, topography, mineral resources, hydrology, and related fields.

The year just ended has been marked by gratifying achievement. For several preceding years the direct appropriations for the Geological Survey, in themselves inadequate, had happily been sufficiently augmented by allotments from Public Works funds to permit the staff to be held together and the work kept reasonably current. But dependence upon uncertain emergency funds does not form the soundest basis for the smooth functioning of a scientific and engineering staff that is difficult to create and difficult to replace. An unstable financial foundation does not encourage the undertaking of the more valuable longer-term major research and technical projects. Thus it was gratifying that for the fiscal year 1938-39 the direct appropriation was restored to its earlier level, although its distribution among the several activities of the bureau was somewhat changed. With this encouragement, which it is hoped foreshadows more adequate and less fluctuating future support, projects could be planned and undertaken with more confidence and could be pursued in a more orderly and effective way.

Geologic investigations, as heretofore, were necessarily divided between fundamental and applied geology. The Geological Survey has always recognized that sound understanding of the principles of any science must precede an attempt to apply those principles in everyday affairs. Hence a part of its energies were devoted to research into the geologic and related chemical and physical processes that have molded the earth and formed and localized the deposits of valuable minerals. Concurrently, a great part of its energies were

given to the search for and the study and mapping of deposits of the metals, nonmetals, and mineral fuels that are essential to the life and well-being of every citizen. This Nation is indeed richly endowed with many of these resources; but, even for those existing in ample store, full knowledge of their location, nature, quantity, quality, and availability is needed for their conservation, wise use, and orderly development. Even more important is the effort to discover new sources of those minerals which are vital to the national economy and the national defense and which thus far have been found in this country only in insufficient quality or quantity. For the minerals in this group the Nation has been dependent almost wholly on foreign supplies. Moderate progress in the search for these strategic and deficient minerals was made during the past year by use of a small allotment of Public Works funds. Hope for greater progress in this task was raised by the enactment, late in the year, of legislation authorizing the appropriation of \$150,000 annually for four years to the Geological Survey for this purpose, beginning with the fiscal year 1939-40.

Among the more unusual geologic investigations of the year was a study, by several Survey geologists in collaboration with scientists of other institutions, of the deep-sea cores taken by Dr. C. S. Piggot, of the Geophysical Laboratory of the Carnegie Institution, between Newfoundland and Ireland. In cooperation with the Public Health Service, studies were made of geologic factors that might have a bearing on the prevalence of tuberculosis in certain areas. A new mineral, shortite, a calcium-sodium carbonate, was discovered in a core from an oil and gas well in Wyoming, and its nature and occurrence are being further studied. A two-volume lexicon of geologic names, long in preparation, was published during the year, and is of great value as a working tool for all geologists in Federal and State agencies, in the teaching profession, and in the oil and mining industries.

Growth of population and of industrial development have brought about in many parts of the country an acute need for more adequate supplies of water. Prolonged droughts have emphasized that need. Disastrous floods have brought increased demands for protection measures. Each year the Nation has become more water conscious, and each year there has been an increased and more vigorous attack upon the problems of conserving already available supplies, of obtaining additional supplies for domestic, municipal, and industrial use and irrigation, and of preventing or controlling floods and developing power. All planning for these projects is dependent upon adequate information on the flow of streams and the amounts of underground water—information that is obtained by the water-resources investiga-

tions of the Geological Survey. Hence there has been a steady growth in the direct appropriations for these investigations, the funds transferred from other Federal agencies for work required by them, and the contributions from States and municipalities for cooperative work. Last year the funds thus made available and the results accomplished by their use were greater than ever before, and further increases are expected.

Topographic surveys, Federal and cooperative, during the past year covered more than 27,000 square miles in 45 States and in Puerto Rico. A feature of the work was the increased use of stereophotogrammetric equipment, by which mapping is accomplished through the use of aerial photographs—a method in which the Geological Survey was a pioneer and which is being constantly studied and improved.

Progress in the topographic mapping of our country, however, is far too slow. The need for adequate maps in national defense and in all forms of national development is so acute that a greatly expanded program, adequately financed, should be undertaken as soon as possible and pushed to early completion. Such a program, endorsed by the Secretaries of War, Interior, and Commerce, was briefly outlined in Senate Document No. 54, Seventy-sixth Congress.

Investigations of the mineral resources of Alaska were continued on a modest scale during the year. The investigations and mapping projects of the Geological Survey during several decades have aided much in the development of the mineral industry of the Territory, whose mineral production now amounts to \$25,000,000 or \$30,000,000 annually and has reached a total of more than three-quarters of a billion dollars.

In the administration of the land-classification and mineral-leasing activities of the Geological Survey more than 9,500 reports were made regarding the mineral resources, water power, or storage possibilities of public land, and the Government's ownership of great reserves of coal, oil and gas, potash, phosphate, and other minerals was safeguarded. Technical supervision was given to more than 8,500 properties containing oil and gas, more than 600 containing coal, and 100 containing other minerals. On Indian land more than 4,900 oil and gas leases were supervised, in addition to more than 200 properties containing coal, asbestos, and lead and zinc. Mineral production during the year from public and Indian lands and naval petroleum reserves under supervision of the Geological Survey had an estimated value of \$83,000,000, and revenue received by the Government as a result of this production amounted to about \$9,500,000.

GENERAL SUMMARY OF THE YEAR'S ACTIVITIES

Geologic work.—Seventy-three field parties worked during the year in 30 States. Of these, 21 parties financed with Public Works Administration funds investigated strategic minerals and made urgently needed classification of public and Indian lands. The strategic-minerals program included examination of quicksilver, chromite, and tin deposits in California; tungsten, quicksilver, nickel, and tin in Nevada; manganese and tin in New Mexico; manganese and chromite in Oregon; manganese and tin in Washington; chromite in Wyoming; and tin in Virginia, North Carolina, and South Carolina. Most of these projects were completed during the year.

Work in cooperation with the States was continued in the metal-mining districts of Colorado, Idaho, and New Mexico and in the oil and gas region of Kansas. In Massachusetts proposed State highway routes were investigated, and geologic factors were considered in planning for flood control. Two cooperative projects were conducted in Tennessee. The study of source beds of petroleum was continued in cooperation with the Petroleum Institute, and physiographic and geologic studies of general educational and direct practical value were continued in the Yosemite, Sequoia, and Zion National Parks in cooperation with the National Park Service. Comparative investigation of gravity anomalies was undertaken with the Coast and Geodetic Survey. The possible relation of geologic conditions to the prevalence of tuberculosis in certain southern areas was studied for the Public Health Service. Other Federal organizations were rendered consultant service by the Geologic Branch.

Ore deposits were studied in mining regions of Alabama, Arizona, Arkansas, California, Colorado, Idaho, Montana, Nevada, New Mexico, the Tri-State district, the southeastern States, Oregon, Utah, Washington, and Wyoming; coal, oil, and gas fields were studied in Arkansas, California, Montana, New Mexico, Oklahoma, Pennsylvania, Utah, and Wyoming. Areal and tectonic studies were made in the Death Valley region of California, the Guadalupe Mountains and Sierra Diablo region of Texas, and the Gulf and Atlantic Coastal Plains. In several field projects airplane photographs were used either in the preparation of base maps or as aids in tracing certain features. The use of airplane photographs in geologic field work is increasing markedly.

Projects were completed in the Jamestown district, Colorado, the Silver Belt of the Coeur d'Alene district and Boise Basin, Idaho, the Little Hatchet Mountains, New Mexico, York County, Pa., Guadalupe Mountains and Terlingua quicksilver district, Texas, Marysville district, Utah, and the region south of Cody, Wyo. Although work in the San Juan region, Colorado, is expected to continue several years, a very valuable report on guides to prospecting in the Uncompahgre (Ouray) district has been completed. A report on the exceedingly complex geologic structure in the Tonopah-Hawthorne region, Nevada, has also been completed.

New major Federal projects other than those on strategic minerals were begun in the Santa Maria Basin, California, Strawberry Valley, Utah, North Cheyenne Reservation, Montana, and Mount Diablo, Texas. A special investigation of outstanding interest was a study of cores obtained by Dr. C. S. Piggot, of the Carnegie Geophysical Laboratory, from the sea bottom at several places between Newfoundland and Ireland. The first and more general part of the report on this study shows striking climatic changes during and since the latest glacial period as reflected by bottom sediments and low forms of animal and plant life.

Geophysical field investigations were conducted in Florida, Kentucky, and Montana, and research on the interpretation of field data and the improvement of apparatus was continued.

A total of 300 reports, of varying scope, embodying the results of field projects that lasted from a few weeks to several years, were in preparation during the year.

In the petrographic laboratory 1,694 thin sections, 193 polished sections, and 195 polished specimens were prepared for optical study of rocks, ores, and minerals. Improvements in the mounting of polished sections and equipment were made.

In the Section of Chemistry and Physics 3,058 examinations, analyses, and tests of rocks, ores, minerals, and samples were made, including 917 for private parties. The examinations of drill cores obtained during prospecting work on leased public lands led to the discovery of the new mineral shortite. Crystallographic, optical, and spectrographic studies led to a better understanding of certain complex closely related minerals. New methods of chemical analysis and improvements in chemical and optical procedure were devised, and base exchange in river clays was studied as a contribution to the subject of sedimentation and the salinity of the ocean. Investigation of bleaching or adsorbent clays has culminated in the completion of a comprehensive report on their distribution, geologic features, physical and chemical properties, and economics. During 1939 attention has been given to the location and development of domestic clays that are the equivalent of special imported clays. Preparation of mathematical tables for calculating deep-earth temperatures was continued, in cooperation with the Works Progress Administration.

Explorations in Alaska.—During the field season of 1938 eight field projects were carried on by the Alaskan Branch. They included three geologic investigations relating to the mineral resources of the Territory, a general study of recent mining developments in the more important camps, and four that were primarily topographic. For the field season of 1939 five field projects—three geologic and two topographic—had been started before the end of the fiscal year 1938-39, and one, a general survey of mining conditions, was undertaken later in the season. All of this work will continue throughout the open season as late as conditions permit. Other work included the usual collection of statistics regarding the production of mineral commodities.

Topographic mapping.—The area covered by new topographic surveys, re-surveys, and revision amounted to 27,110 square miles. In the topographic mapping, done in 45 States and Puerto Rico, 16 States, Puerto Rico, and the Tennessee Valley Authority cooperated. The area covered by planimetric maps without contours, compiled from aerial photographs, covered 2,180 square miles in 3 States. By a cooperative agreement with the Tennessee Valley Authority, the Geological Survey mapped from aerial photographs by stereophotogrammetric methods 1,974 square miles. In connection with this work, 15 complete stereophotogrammetric units are installed and in use at the Chattanooga office of the Geological Survey. One hundred and seventeen square miles was mapped by stereophotogrammetric methods in the Washington office. This method of mapping is continuing to gain favor. It has been proved conclusively that this method is adaptable, with added economy and speed, to areas whose relief ranges from moderate to great. In addition to the routine adjustment of primary control, there has been in progress a general adjustment of both horizontal and vertical control to agree with the standard datums of the United

States. During the year six bulletins reporting the results of control surveys have been prepared, and four that had been previously prepared were published. The office work on river surveys that were made by the Conservation Branch is steadily progressing. The maps of 22 projects were sent forward for reproduction during the year. The preparation of the Transportation map of the United States for the Bureau of Public Roads was continued, and maps of 3 States were published or are in proof. Maps of 16 States were in course of publication. Work on the United States part of the map of the world on the scale of 1:1,000,000 was continued. One hundred seventy-one topographic maps were prepared for photolithographing and 60 for engraving, and 375 maps of all kinds were prepared for reprinting.

Investigations of water resources.—The Water Resources Branch collected and prepared for publication stream-flow records at 4,165 river-measurement stations in 47 States, the District of Columbia, and the Territory of Hawaii, thus obtaining information on the behavior of streams in drought, in flood, and in normal conditions—that is invaluable for planning projects for use or control of the surface-water supply. It investigated underground water supplies in 37 States, Hawaii, and the Virgin Islands, and obtained information on the occurrence, quantity, and quality of these supplies, which is essential for the development, conservation, and use of ground water upon which a large part of the population of the country must depend. Investigations of stream flow and silt movement of streams on four projects of the Soil Conservation Service and on the Colorado River and its tributaries were continued. Analysis were made of 1,895 samples of water from surface and underground sources with reference to their suitability for industrial and agricultural uses and for domestic use, so far as such use is affected by the dissolved mineral matter. The annual report of the capacity of water wheels in water-power plants in the United States of 100 horsepower or more as of January 1, 1939, was compiled. Engineers of the Branch had general supervision of operation of 160 projects under permits and licenses of the Federal Power Commission and operated about 295 gaging stations in connection with 118 projects of that Commission. Investigations of the water problems along the international boundary between the United States and Canada were continued for the State Department. The collection of information on recent outstanding floods was continued.

Classifying public land and supervising mineral leases.—The Conservation Branch made 9,638 formal findings of technical fact involving the mineral resources, water power, or storage possibilities of public land; added 19,924 acres to outstanding water-power reserves and eliminated 4,480 acres therefrom; defined the known geologic structure of 10 producing oil and gas fields involving 142,061 acres; completed 780 miles of river-utilization surveys and surveyed in detail 12 dam sites in public-land States; prepared 4 reports based on geologic and geophysical studies of formation materials and conditions at dam sites; administered activities and operations under 160 power projects licensed by the Federal Power Commission and 172 permits and grants from the Department of the Interior; supervised on public land 8,560 oil and gas holdings involving 4,503 productive wells and 685 coal properties, 42 potash properties, 70 sodium properties, 27 sulphur properties, and 7 prosphate properties involving 490 productive mines; continued to assist oil and gas permittees and operators in the preparation of unit plans of development and operation; classified about 250 outstanding oil and gas prospecting permits under the extension provisions of the act of August 26, 1937 (50 Stat. 842); supervised on naval petroleum re-

serves 22 leaseholds involving 284 productive oil and gas wells; and on Indian land 4,984 leaseholds involving 4,039 oil and gas wells, 246 mining properties involving 45 lead and zinc properties, 151 coal properties, and 50 other mineral properties; changed territorial delineation of two mining districts and created a new mining district with headquarters at Carlsbad, N. Mex.

Publications.—The publications of the year consisted of 63 reports in the regular series and 21 pamphlets and circulars for administrative use, a total of 12,713 pages; 301 new or revised topographic and other maps and 278 reprinted maps. Among the book publications were a lexicon of geologic names of the United States (including Alaska), geophysical abstracts, a paper discussing the force required to move particles on a stream bed, reports on the geology and mineral resources of the Fortymile, Eagle, Circle, Nushagak, and Slana-Tok districts and the Chitina Valley, Alaska, and on the nickel content of an Alaskan basic rock; the geology and mineral resources of areas in Arkansas, New Mexico, Oregon, Pennsylvania, Texas, and Utah; oil and gas resources of areas in Oklahoma; spirit leveling in Missouri; records of water levels and artesian pressure in observation wells in the United States in 1937; ground water in the Snake River Plain and Mud Lake region, Idaho, and Holbrook region, Arizona; the floods in the Canadian and Pecos River Basins of New Mexico in May and June 1937, of the Ohio and Mississippi Rivers in January and February 1937, and in Texas in 1935; the drought of 1936; the quality of water of the Rio Grande Basin above Fort Quitman, Tex.; an inventory of unpublished hydrologic data; the 15 annual papers on surface-water supply in the United States and Hawaii; and several papers on paleontology. A new edition of the general list of publications of the Geological Survey was also issued. Besides these printed reports 55 brief papers were issued in mimeographed form as memoranda for the press or as informative circulars.

The Division of Engraving and Printing printed more than 1,003,600 maps and did repay work amounting to about \$174,000 for 71 other units of the Federal and State Governments.

GEOLOGIC BRANCH

GENERAL GEOLOGIC STUDIES

A study of the deep-sea cores taken by Dr. C. S. Piggot, of the Geophysical Laboratory of the Carnegie Institution, between Newfoundland and Ireland was made by six Survey geologists and several other scientists representing the Biological Department of the University of Buffalo, the Philadelphia Academy of Natural Sciences, the National Museum, the Bureau of Chemistry and Soils of the Department of Agriculture, and the Geophysical Laboratory. The resulting report on the geology and biology of these cores has been submitted to the Geological Survey for publication.

A lexicon of geologic names was issued as Bulletin 896. Definitions of the more than 10,000 named stratigraphic units in the United States and Alaska, which are scattered throughout the geologic literature of the past 100 years, were summarized and brought together during a period of about 25 years by the Secretary of the Survey's

Committee on Geologic Names. The lexicon will be a valuable aid to all geologists, including those in State geological surveys, in colleges and universities, and the host of geologists connected with the oil and mining industries. It will also help to prevent undesirable duplication of stratigraphic names.

Chapters on coal, petroleum, and natural-gas reserves were prepared for the National Resources Committee summary report of a national energy survey; and a paper on our petroleum reserves was published in the *Journal of the Washington Academy of Sciences*. Studies of source beds of petroleum, types and ranks of coal, and nomenclature of Carboniferous sedimentary rocks were continued. General studies of the application of geophysics to geology have been continued, new apparatus—gravimeters and seismic exploring units—has been designed and perfected, and new methods have been developed. Geophysical abstracts covering the period October 1937 to September 1938 were issued. Other investigations included Foraminifera of the Cretaceous formations of the Gulf Coast region, the genus *Ceratopea*, Tertiary echinoids of the eastern United States, and Globigerinidae. General studies of strategic minerals have been continued or resumed, and additional information was gathered on phosphate reserves.

WORK IN CHEMISTRY AND PHYSICS

Much of the work was devoted to the study of new minerals, the analysis and description of samples of minerals of economic value from several new localities, and extensive series of analyses to determine the economic possibilities in different areas containing various raw materials, such as phosphates, potash, manganese, and iron ores, mainly on public lands. This work was not restricted entirely to surface samples but dealt also with well cuttings and well cores and with physical measurements at depth.

More definite evidence was obtained of the existence at depth of a considerable bed of carnallite, in Grand County, Utah. This mineral is well known in foreign potash fields but has hitherto not been found in any large quantities in this country. Nickel was determined in basic rocks from Nevada and Admiralty Island, Alaska. A clay from high swampy areas in the Hawaiian Island, the only ceramic clay in the islands, was found to carry a high proportion of titanium, but this does not interfere with its economic use. In all, 3,058 examinations, analyses, and tests of rocks, ores, minerals, and samples were made during the year. These included 917 specimens identified for private parties, 860 chemical analyses made

officially for geologists, and 632 analyses made in connection with research problems, analytical methods, and geochemical and geophysical investigations. The remaining tests related to core samples, well cuttings, and similar materials. Logs of more than 10 deep wells in New Mexico and Utah were completed, with accompanying analyses of individual sections.

Special investigations included a study of the new mineral, shortite, a calcium-sodium carbonate, discovered by J. J. Fahey in a core from the Hay oil and gas well, Sweetwater County, Wyo. The analysis and structural interpretation by X-rays of new varieties of beryl and mica have shown those minerals to have essential differences not hitherto understood or even recognized. Electrical measurements were made on several proposed dam sites in Arizona, Colorado, and the potash area of New Mexico to determine underground conditions. A rapid volumetric method for the determination of fluorine in phosphate rock and other analytical methods were studied and analyses were made of soils from Alabama and Tennessee, in collaboration with the Public Health Service, with reference to the distribution of tuberculosis.

Goniometer measurements were made on crystals of calcite, dolomite, shortite, and regular intergrowths of kleinite and calomel. The relations of rhodonite, pyroxmangite, bustamite, and johannsenite, all manganese silicates, were studied more fully. A series of analyses on secondary sulphate minerals, including some new minerals, from the Tintic Standard mine, Dividend, Utah, was completed and work was begun on similar minerals from Butte, Mont.

Spectrographic tests were made on several minerals and rocks in a search for different minor constituents, a number of which were found or identified in this way. Several commercial ores mined under royalties to the Government were checked as to their content of valuable constituents. A very extensive series of analyses of phosphates from Wyoming was made both for the phosphate content and for several other constituents that may throw light on the conditions under which the phosphatic beds were deposited. Determinations were made of the heavy minerals in placer concentrates from Alaska. Some base-exchange studies of river clays were made to explain the clay's contributions to the sea.

Work on more than 5,000 samples of adsorbent clays has led to the preparation of a report on the geologic age and geographic distribution of those clays, their physical and chemical properties, and the economics of their production. During the past year attention was given to the location and development of American clays that

are the equivalent of the special clays imported from Japan for use as petroleum catalysts, from England for lard refining, and from Germany for petroleum refining. Tests of clays suitable for molding sands led to the location and exploitation of deposits that are now producing 20 tons a day. Additional weight-temperature curves have been run, which are useful in the identification of hydrous minerals and carbonates. Research work has been devoted to the study of special methods for the analysis of clays and to the synthesis of clay minerals.

A final report is being prepared on deep earth temperatures, which will include a summary of all the deep earth temperature data of the world and also a sufficient number of mathematical tables to permit handling problems in geothermics on a rigorous mathematical basis with a minimum amount of labor.

The work in chemistry and physics is mainly confined to the laboratories. However, field work was done in Colorado, Arizona, New Mexico, and Wyoming.

WORK OF THE YEAR BY STATES

Alabama.—Geologic investigations continued on iron ores of Red Mountain formation in northeastern Alabama; on brown iron ore in Russellville district; and on stratigraphy of Upper Cretaceous formations of Alabama and Mississippi. Report on geologic factors affecting tuberculosis in Giles County, Tenn., and Coffee County, Ala., was made for Public Health Service. Tectonic map of the Coastal Plain of Alabama and northern Florida was prepared for a Committee of the National Research Council. Paleontologic and stratigraphic studies were made of several formations and of upper Eocene Mollusca from Alabama and Mississippi.

Arizona.—Investigations continued of geology and mineral resources of Benson, Pearce, and Tucson quadrangles; and of manganese deposits in Artillery Peak Mountains. Report on Ajo quadrangle was completed. Geology of Lone Pine Reservoir was examined for Public Works Administration.

Arkansas.—Manuscripts of report on manganese carbonate in Batesville district and of bulletin on geology of Fort Smith district were completed. Work on reports on fauna and stratigraphy of Morrow group of Arkansas and Oklahoma was continued.

California.—Reports on geology of Kettleman Hills oil field and of Palos Verdes Hills were completed. Studies of subsurface and economic phases of Kettleman Hills oil field; of geology and oil resources of lower Tertiary strata of Reef Ridge; of Foraminifera of Kreyenhagen shale of Garza Creek; and of petrology of siliceous rocks of Monterey formation continued. Investigation of surface and subsurface stratigraphy, structure, and lithology of entire Santa Maria Basin, Santa Barbara County, and bearing of the geology on discovery and development of oil and gas in that area began. In connection with study of source beds of petroleum, conducted in cooperation with American Petroleum Institute, data were collected from several oil fields in Los Angeles Basin. An

article entitled "Calcium carbonate content of some California Mesozoic and Tertiary sediments" was submitted for outside publication.

Areal and structural studies continued in Death Valley region; in San Andreas Rift area; on geology and ore deposits of Ivanpah quadrangle, California-Nevada; on geomorphology of San Joaquin Basin; and on problems of igneous geology in Elsinore, San Luis Rey, and Corona quadrangles. Papers on Tertiary history of Ivanpah region and on structural features of Death Valley region were written for outside publication. A new edition of an oil and gas map for State of California was issued.

Cooperation with the National Park Service continued in preparation of geologic exhibits for Yosemite and Sequoia National Parks and of a paper on the geology of Sequoia National Park. Studies continued of glacial deposits in relation to fault scarps at the east front of the Sierra Nevada. A paper on the history of faulting movements at the east front of the Sierra Nevada as indicated by dislocated moraines was written for outside publication. Studies of strategic minerals, financed by Public Works funds, included quicksilver deposits of Mayacmas and Sulphur Banks districts in and near Lake County, tin in Temescal district, and chrome deposits in Seiad quadrangle. A paper on some features of quicksilver deposits in and near Lake County was prepared for outside publication.

Colorado.—Cooperation with Colorado State Board and Colorado Metal Mining Fund continued. Reports on Ouray and La Plata districts were nearly completed, and investigations continued in Telluride and Red Mountain districts of San Juan area. Report is in progress on Red Mountain-Telluride-Camp Bird-Sneffels area, and one on discontinuities in mineral sequence of San Juan mining district was prepared for outside publication. Paper on structural control of ore deposition in Uncompahgre district was completed. Studies continued of Gold Hill mining district. Preliminary report on this district and paper on nickel deposit near Gold Hill were prepared for outside publication. Detailed report on geology and ore deposits of Jamestown district is nearly completed, also one on deposits of radioactive cerite deposits near Jamestown. Report on geology and ore deposits of Front Range is in progress, and preliminary geologic map of Front Range has been issued. Geologic map of Leadville mining district has been issued by Geological Survey, and explanatory text entitled "Preliminary report on the west slope of the Mosquito Range in the vicinity of Leadville, Colo.," has been published by Colorado Scientific Society. Paper on vein systems of Cripple Creek district and their relation to major structural features was submitted for outside publication. A more comprehensive report on Leadville and one on Cripple Creek district are in preparation for Survey publication. Work was continued in Alta Basin and vicinity; and in Chattanooga, Kokomo, and Tarryall districts and Nederland tungsten district. Papers on geology, mineralization, and placers of Tarryall and Beaver Creeks, Park County, and on vein solutions and rock alteration in Boulder County tungsten district were prepared for outside publication. In connection with proposed extension of Rocky Mountain National Park, geology of southern end of the Park was mapped for National Park Service.

Florida.—Study of physical geography of the State was completed in cooperation with Florida Geological Survey, which is to publish the report. Work was done on revised geologic map of the State. Report on molluscan fauna of Alum Bluff group—gastropods—was completed for Federal Survey publica-

tion, and papers on Upper Tertiary and Pleistocene mollusks of Florida and on Oligocene deposits in Citrus County were submitted for outside publication. Magnetic survey was undertaken and report on geophysical survey of north central Florida is in preparation. Hearings of congressional committee on phosphate held at Lakeland were attended by geologist from Federal Survey with view to revision of estimates of reserves in Florida. Press release on subject was issued by Federal Survey. The tectonic map is mentioned under Alabama.

Georgia.—Manuscript geologic map of coastal plain of Georgia and its accompanying text, prepared in cooperation with the State, were completed. Study of geology and mineral resources of Cartersville region was continued, and paper entitled "Sienna (Ocher) Deposits of the Cartersville District, Georgia," was submitted for outside publication. Studies of Upper Cretaceous formations, an extension of investigations in Alabama and Mississippi, were continued.

Idaho.—Work in cooperation with the State was continued in Rocky Bar district and Seven Devils area and was begun in Pine district and New Meadows-Riggins area. Reports on geology and ore deposits of Boise Basin and on placers of Secesh Basin are in preparation. Reports on Dixie placer district, Florence mining district, Atlanta district, and metalliferous deposits of Kootenai County were submitted for publication by the State. Article on use of sedimentation features and fracture cleavage in recognizing overturned strata in Belt rocks of Coeur d'Alene district was prepared for outside publication. Report on geology of Brown and Spangler dam sites, Mann Creek, Washington County, was made for the State.

Noncooperative projects consisted of study of geology and mineral resources of Borah Peak quadrangle; geomorphology of Paradise Valley quadrangle; glacial geology and physiography of part of Idaho adjoining western Montana; and fossil plants from Fort Union and associated formations. Field work was continued in Afton quadrangle and in Irwin and Victor quadrangles with special reference to phosphate.

Illinois.—Monographic study of lower Pennsylvania floras of Illinois and adjacent States begun by the late David White in cooperation with the State was completed in manuscript. Report on Fusulinidae of Pennsylvanian series in Illinois was completed for publication by the State. Study of conditions resulting from Ohio River flood of 1937 was published.

Indiana.—Part 3 of report on flora of New Albany shale (Upper Devonian) and report on new crinoid genus from an upper Mississippian formation of Indiana are in preparation. Study of conditions resulting from Ohio River flood of 1937 is mentioned under Illinois.

Iowa.—Study of Kinderhook fossils from Burlington continued.

Kansas.—Investigation of subsurface Mississippian rocks was continued in cooperation with the State. Map of central and eastern Kansas showing thickness of Mississippian limestones as revealed by well records, the fields that have produced oil and gas from Mississippian rocks, and fields that have produced oil and gas from other rocks on anticlines, with explanatory text, was submitted to the State for publication. The State published cooperative report on geology and coal resources of southeastern Kansas coal field in Crawford, Cherokee, and Labette Counties. Map of the State showing oil and gas fields and producing formations is in preparation. Shoestring sands are mentioned under Oklahoma. Lead and zinc are mentioned under Tri-State.

Kentucky.—Geophysical study to locate position of faults was made in fluor-spar area of Crittenden and Livingston Counties. Work on Pennsylvanian floras is mentioned under Illinois and on New Albany shale under Indiana. Study of conditions resulting from Ohio River flood of 1937 is mentioned under Illinois.

Louisiana.—Revised map of the State showing oil and gas fields was published.

Maryland.—Study of Pocono flora and of Pottsville formation is mentioned under Pennsylvania. Geologic map of Frederick County, with structure sections, prepared in cooperation with the Maryland Geological Survey, was published by the State. Geophysical investigations were conducted in the Soldiers Delight and adjacent areas.

Massachusetts.—Geologic work was begun in cooperation with the State. Detailed studies of geology and mineral resources and glacial and physiographic features were under way in Norwood, Lowell, Lawrence, Blue Hill, and Milford quadrangles; and geologic work was done in various sections of the State in relation to highway construction and flood control. Reports were sent to the State on geology of the coast line between Hyannis and Chatham, Cape Cod; on geologic problems of proposed sewer for town of Plymouth; and on geological examination for well site on farm near Sutton. Four special geologic reports relating to highway-construction projects were transmitted to Highway Division. Reports on commercial granites, on geology of granite deposits, and on origin of Chelmsford granites are in preparation.

Michigan.—The report on the cooperative electrical resistivity studies in Michigan will be published by the State. A supplemental report on the Ashley area resistivity investigations and a paper on the fauna of the Marshall sandstone are in preparation.

Mississippi.—Studies were continued of stratigraphy of Upper Cretaceous deposits of Mississippi and of fauna of Vicksburg group. Field work was resumed in Jackson and Pelahatchie quadrangles. Papers were submitted for outside publication on fossil mollusks preserved as clay replacements near Pontotoc; equivalence of Gosport sand to Moodys marl; recent collections of upper Eocene Mollusca from Mississippi and Alabama; and stratigraphy of Upper Cretaceous series in Mississippi and Alabama. Press memorandum on oil possibilities of Columbus anticline with accompanying sketch map was issued.

Montana.—Investigation of geology of Little Rocky Mountains and adjoining regions in Phillips and Blaine Counties and of Fort Belknap Indian Reservation was continued. Paper on large boulders and glacial striae near Little Rocky Mountains was published in an outside journal. Coal resources of Otter Creek area, Powder River, Rosebud, and Big Horn Counties, and of northern Cheyenne Indian Reservation and southern part of Custer National Forest were mapped. Projects on Black Hills Rim, Pleistocene and Recent fault scarps in western Montana, glacial geology and physiography of western Montana, and Lance-Fort Union correlation of southeastern Montana were continued. Reports on Pioneer Gold district and on fossil plants of Fort Union and associated formations of Montana, North Dakota, and Wyoming were in preparation. Magnetometer surveys were conducted in Highwood Mountain area to locate and map possible feeders of two laccoliths, and paper on the results was prepared for outside publication.

Nevada.—Field and office work on general geology and ore deposits of Hawthorne and Tonopah quadrangles, resurvey of Comstock Lode district, and structure of Basin Range was continued; and general geologic and stratigraphic

study of Eureka district and reconnaissance study in Sonoma Range quadrangle were begun. Bulletin on Jurassic orogeny in west-central Nevada was completed. Report is in preparation on Reese River mining district that will include section on resistivity and magnetometer measurements. Investigation was made of Tertiary gravel channel at south end of Washoe Valley to evaluate magnetic and resistivity methods for locating buried channels and determining their sizes and depths. Studies of strategic minerals, financed by Public Works Administration, included Gold Banks quicksilver district in Pershing County, Table Mountain nickel deposits, Key West nickel district, nickel deposits in Cottonwood Canyon, Churchill County, Lovelock quadrangle tungsten area, and Majuba Hill tin district. Study of fresh-water diatoms in Mineral, Esmeralda, and Nye Counties was made; and papers on fresh-water invertebrates and land plants of Cretaceous age from Eureka, on Recent fault scarps in western part of Great Basin, and on relation of structure to earthquakes in Great Basin were submitted for outside publication. Studies of Ivanpah quadrangle are mentioned under California.

New Mexico.—Field work on east side of San Juan basin in Rio Arriba and Sandoval Counties was completed, and areal geologic map and report on geology, coal, gas, and oil resources are under way. Paper on intertonguing transgressive and regressive deposits by fill in a sinking trough, a study of Mancos and Mesaverde formations in southern San Juan Basin, is in preparation. Other reports in various stages of completion are: Geology and Ore Deposits of Magdalena district, Geology and Ore Deposits of Little Hatchet Mountains, and Potash Mines Quadrangle. Strategic minerals projects consisted of study of manganese deposits of Little Florida Mountains and Taylor Creek tin deposits. Brief papers on stratigraphy in Pecos Valley, on Basin and Range province, and on abutment problems at Zuni Dam, were prepared for outside publication.

New York.—Study of general geology of Millbrook quadrangle, New York and Connecticut, was continued. Report on subsurface structure in parts of western New York and mode of occurrence of Medina gas was completed for Survey publication.

North Carolina.—The tin belt of North Carolina near Lincolnton was studied in some detail as a Public Works project. Papers on Miocene diatoms from Hamilton Wharf, on Pleistocene fossils from well at Hatteras, and on gastropods from Miocene and Lower Pliocene of Virginia and North Carolina are in preparation.

Ohio.—Study of Devonian and Carboniferous faunas from Ohio and Pennsylvania was completed. Flood study is mentioned under Illinois.

Oklahoma.—Study of subsurface geology and oil and gas resources of Osage County was continued, and reports on a number of townships were submitted for publication by the Geological Survey. Geologic mapping in Ouachita Mountains was continued. Papers on relation of oil in Mississippian lime and shoestring sands of Cherokee shale in Osage County and on geologic interpretations of gravity anomalies in Atoka and Bryan Counties were presented for outside publication. Map of oil and gas fields of Oklahoma was issued. Studies of Morrow fauna and stratigraphy in Pennsylvanian series, of Moorefield fauna in Mississippian series, and of flora of coal fields of eastern Oklahoma are in preparation. Lead and zinc are mentioned under Tri-State district.

Oregon.—Paper on Salem Hills, North Santiam River section of Oregon Cascades, and revised geologic map of Sumpter quadrangle with accompanying

text are being prepared for publication by the State. Fresh-water diatoms near Dayville were studied. Paper on Permian Fusulinidae from eastern Oregon is in preparation. Fauna and stratigraphy of Carboniferous rocks near Paulina, Crook County, were studied.

Pennsylvania.—Detailed section of coal-bearing rocks in Pennsylvania across Appalachian coal basin was constructed from diamond-drill cores. Work was continued on report on regional metamorphism in lower Kittanning coal beds. Cooperative report on geology and mineral deposits of York County was completed for publication by the State, and one on Hanover and York quadrangles, for Survey publication, is well advanced. Field work on geology of Reading Hill was conducted. Devonian and Carboniferous faunas are mentioned under Ohio. Stratigraphic studies were made and specimens were collected of flora of Pottsville and post-Pottsville formation, of Mississippian age, in southern anthracite coal field. Papers are in preparation on stratigraphy and flora of Pocono and Pottsville of Virginia, West Virginia, Pennsylvania, Maryland, and on some structural features of Northern Anthracite Coal Basin, for professional paper.

Southern Appalachians.—Brief report on structural control and form of ore shoots in southern Appalachian gold deposits was submitted for outside publication. Report on gold deposits of southern Appalachians, including areas in Virginia, North Carolina, South Carolina, Georgia, and Alabama, is nearing completion.

South Carolina.—Search for tin deposits near Gaffney was conducted as a Public Works project. Paper on elliptical bays in Horry County was presented before the American Association for Advancement of Science. Report was made on geology of Rocky River dam site, Abbeyville, to Public Works Administration. Gold is mentioned under Southern Appalachians.

South Dakota.—Study of tin deposits near Tinton was in progress, as part of investigation of strategic minerals under Public Works allotment.

Tennessee.—Studies in cooperation with Tennessee State Geological Survey were continued on manganese ores in Perry and Lewis Counties and on stratigraphy of Mascot area, in Jefferson City zinc district. Brief examination of Co-op coal bed at Cumberland Homesteads was made for Farm Security Administration. Fossils were collected and stratigraphic studies were made of Chazyan rocks, of lower Paleozoic age, in Appalachian Valley and of Carboniferous floras in northern and southern Tennessee coal fields. Brief paper on mineralization of Sweetwater barite deposits was submitted. Giles County is mentioned under Alabama.

Texas.—In Sierra Diablo area and vicinity geologic mapping was continued. Papers on relation of Permian sedimentation to tectonics in Guadalupe Mountain region and on older rocks of Van Horn region will be published by an outside journal. Comprehensive report on geology of southern Guadalupe Mountains has been completed for Survey publication. Professional Paper 187, on geology of Marathon region, was published. Bentonite and fullers' earth deposits in Jasper, Newton, and Sabine Counties were studied. Reports on Shafter silver district, Presidio County; on Terlingua quicksilver district of Brewster County; and on stratigraphy and fossils of Navarro group were nearing completion. Paper on Terlingua quicksilver district was prepared. Examinations were made of tin and manganese deposits in Franklin Mountains and of manganese near Chispa Siding.

Stratigraphic and paleontologic studies were continued as follows: Carboniferous near Alpine; revision of Guadalupian fauna of Permian age; some

upper Permian Foraminifera from west Texas; new Fusulinidae from Cisco groups in Brazos River region; Eocene of southeastern Texas; and Cambrian and Ordovician in Central Hill district. New edition of map of oil and gas fields of Texas and report of results of geophysical survey of bolson deposits in El Paso area are in preparation. Report on brown iron ores of eastern Texas was published.

Tri-State district.—Field work for study of Tri-State zinc and lead district of Kansas, Oklahoma, and Missouri was completed, and report covering these investigations of several years is in preparation.

Utah.—Studies were resumed of geology and mineral resources of Henry Mountain region of southeastern Utah; and of Strawberry Valley and adjacent parts of Coalville quadrangle, which embrace the eastern flank of the Wasatch Mountains. Paper on Permian of parts of Rocky Mountain and Colorado Plateau regions was presented for outside publication. Geologic mapping with reference to alunite, gold, silver, and other mineral deposits was continued in region covered by topographic maps of Delano Peak, Beaver, Sevier (part), and Marysvale and vicinity, and of Hurricane fault zone. Papers are in preparation on Green River Desert-Cataract Canyon region, Emery, Wayne, and Garfield Counties; on late Mesozoic and early Cenozoic history of central Utah; and on Pennsylvanian and Permian Fusulinidae from Strawberry Valley area. Paper for Survey publication was prepared on geology of Bull Valley iron-ore district, with notes on iron-ore pits at Desert Mound and Iron Mountain, southwestern Utah. Memorandum for the press on geology and iron-ore deposits of Bull Valley district was issued. Studies of high plateaus in southwestern Utah were continued, especially with reference to supplying information to National Park Service on Zion and Bryce Canyon National Parks and Cedar Breaks National Monument. Papers were submitted for outside publication on glaciation in Wasatch Plateau, geographic and geologic sketch of Capitol Reef region, origin of pediments around Henry Mountains, Recent fault scarps in western part of the Great Basin, volcanic sequence in Marysvale region in southwest-central Utah, and manganese deposits of Drum Mountains.

Vermont.—Studies of commercial granites and mapping of granite quarries of New England, including Barre quadrangle, were continued.

Virginia.—Under Public Works allotment, studies were made of tin-bearing rocks in Irish Creek district and of nickel mine in Floyd County. Study of the great Gossan lead in cooperation with the Virginia Geological Survey was continued. Manuscript on Vacluse gold mine, Orange County, was completed. Studies of the Pocono are mentioned under Pennsylvania; of Chazyan rocks, under Tennessee; of Mollusca (gastropods), under North Carolina; and of gold, under Southern Appalachians. Papers were prepared for outside publication on Pleistocene shore-line features of southeastern Virginia, a Tertiary marine formation in northeastern Tidewater Virginia and southern Maryland, and age relations of pre-Cambrian rocks in Catoctin Mountain-Blue Ridge and Mount Rovers anticlinoria in Virginia.

Washington.—Study of manganese deposits in Olympic Peninsula was begun under a Public Works allotment. General reconnaissance of manganese belt was made; studies of mines and examination of prospects were included. In connection with study of fresh-water diatoms, collections were made from several sections in Latah, Ellensburg, Ringold, Wahluke, and Columbia lava formations. Report is in progress on geology and ore deposits of Metaline district. Reconnaissance trip for study of glacial geology and physiography

was made by way of Mount Hood up Columbia River Valley to site of Coulee Dam, Spokane, and Metaline Falls.

West Virginia.—Ohio River flood studies are mentioned under Illinois. Study of the Pocono is mentioned under Pennsylvania. Stratigraphy and paleontology of Pennsylvania strata, chiefly Pottsville formation, along New River were studied.

Wyoming.—Studies of geology of west side of Big Horn Basin in northwestern Wyoming, including Badger Basin oil field, and of northeastern flank of Big Horn Basin, Big Horn and Park Counties, Wyo., and southern Carbon County, Mont., were continued. Preliminary map showing geologic structure of Byron-Frannie area, Big Horn and Park Counties, was issued. Paper on intrusive breccia along east margin of Absaroka Mountains was prepared for outside publication. Structure map and text on geologic structure of Shoshone anticline and area northwest of Cody was prepared for preliminary publication. Studies of Tertiary rocks of Green River and Bridger Basins and of Fossil syncline and of geology and mineral resources of Afton quadrangle were continued. Geologic field mapping in northwest corner of Cokesville quadrangle was begun in connection with study of geology and phosphate and other mineral resources of Afton quadrangle and vicinity. Work on Black Hills Rim and on Fort Union and associated formations is mentioned under Montana. Casper Mountain chromite deposits were surveyed by magnetometer.

ALASKAN BRANCH

The work of the Geological Survey in Alaska, although embracing many activities similar to those performed in the States, presents aspects that call for somewhat specialized treatment, so that it can be administered on a geographic basis rather than through the other Geological Survey units. In a pioneer country like Alaska, the call for information is related more to exploration and reconnaissance than to the intensive, detailed studies that are in demand in the States. Even now, more than 300,000 square miles of the Territory has not been surveyed even on exploratory standards. The need is urgent to reduce the extent of this vast unsurveyed domain. Then too, in the areas that are slightly known there are problems requiring more thorough examination if the national resources of the country are to be wisely administered and productively developed. At present considerably less than 1 percent of the area of Alaska has been mapped in adequate geological or topographic detail. Detailed studies would well repay their cost in delimiting areas of potential mineral value from those more suitable for other purposes and would also furnish guidance for development programs requiring the consideration of routes of transportation, settlement, power developments, and land utilization.

Although the work of the Geological Survey in Alaska contributes to widely diversified activities, its direct purpose is to aid in the wise development of the mineral resources of the country. Already these

resources have contributed minerals to the value of nearly \$778,000,000, and to this total between \$25,000,000 and \$30,000,000 is added each year. About two-thirds of this mineral wealth has been recovered from the gold mines, but mines of copper, silver, coal, lead, platinum metals, tin, and a dozen other mineral commodities have contributed to this total. To help in the discovery of new deposits, as well as to furnish technical advice as to possible extension or development of those already found, has called for field investigations throughout the Territory, in the course of which nearly 300,000 square miles has been mapped topographically and geologically, and all of the known mining camps have been examined with varying degrees of thoroughness. The results of those investigations are made available to the public as printed reports and maps, and many additional data are available to the Government in the form of field notes and unpublished records:

Field work.—The field projects in Alaska are better described by field seasons than by fiscal years, because the field work is generally started in May of one fiscal year and continued as late as practicable into September or October the succeeding fiscal year. Thus the projects in the field season of 1938 were financed by funds appropriated for the fiscal years 1938 and 1939, and those in the season of 1939 were financed by funds for the fiscal years 1939 and 1940.

For the field season of 1938 eight field projects were carried on by the Alaskan Branch, of which four were principally geologic investigations of the mineral resources of the Territory and four were primarily topographic surveys. The surveys on Chichagof Island, in southeastern Alaska, were to obtain detailed information about the geologic conditions at the gold lode mines that have long been productive, so as to delimit areas in the vicinity that appear to be worth prospecting from the less promising areas. The work in the Alaska Range region, already in progress for a number of years, was aimed to acquire all pertinent facts regarding the prospective mineral resources of value in this extensive tract. The investigations in the Yukon Valley west of the international boundary covered part of the tract of old consolidated gravel deposits of Tertiary age that appear to have been the source from which has been derived much of the gold that was later concentrated by the present streams to form the workable placers that are now being profitably mined in adjacent areas. The fourth geologic project, undertaken after the close of the fiscal year 1937-38, was a general study of recent mineral developments in the principal producing camps of the Territory.

The four topographic projects include work on Chichagof Island, in parts of the Alaska Range in the northern part of the Copper River Valley, photographing from the air parts of the Tanana Valley east of Fairbanks, and photographing from the air certain tracts on Admiralty Island, southeastern Alaska, that cannot readily be covered by ground methods of survey. The topographic mapping on Chichagof Island was on detailed standards to serve the immediate needs of the geologic work in progress there. The work on Admiralty Island served to fill in several gaps in the completion of the mapping of the island, an undertaking that had been under way by ground methods in 1935 and 1936. Topographic mapping in the Alaska Range in 1938 covered

a considerable area in the valley of the Nabesna River and its neighborhood by reconnaissance surveys and a small tract in the vicinity of the Nabesna mine by detailed surveys. The aerial photographic work in the Tanana Valley connected with earlier photographic work done by the War Department from Fairbanks southward. This work resulted in obtaining photographs suitable for use in the cartographic representation of most of the lowland of the Tanana River from Fairbanks eastward to the international boundary, with the exception of that part from the Delta River to Tanana Crossing. In the course of this work some oblique views of parts of the Alaska Range were obtained, which have been useful in mapping the section of the Range that forms part of the watershed of the Copper and Tanana Rivers.

For the season of 1939 six field projects were carried on. Three were principally geologic investigations of mineral resources, one was a general field study of recent mining developments in the principal mining camps of the Territory, and two were primarily topographic surveys. As all of these projects are still in progress in remote areas, out of touch with ordinary means of communication, details as to their specific accomplishments are not now available. The areas in which the principal new geologic projects were undertaken were on Chichagof Island in southeastern Alaska, in the Alaska Range, at the head of the Copper River, and in the tin fields of western Seward Peninsula. The work on Chichagof Island aimed to expand to the north surveys begun in 1938, to disclose the extent of the potential mineral resources in that area. It is expected to reach the prospective nickel-bearing area on the north coast of Chichagof Island and Yakobi Island and to examine those deposits with especial care to determine their significance in affording a source of ore that might lessen the nation's dependence on foreign countries. The work in the Alaska Range is an extension of the work of the last few years. Its main purpose is to revise earlier work in the district and to cover hitherto unsurveyed tracts, so as to present an authoritative up-to-date statement regarding the mineral resources of several thousand square miles of country which contains deposits now being mined and which may contain others not yet developed. The work in the tin fields of western Seward Peninsula is to afford specific quantitative estimates as to the amount of tin that may reasonably be counted on. Solution of this question is of special importance because this is the only area in the United States that has produced significant amounts of tin mineral, and the dependence of many industries on foreign sources for their tin supply is a matter of concern in our national economy.

The two topographic projects cover work in the Alaska Range near the Wrangell Mountains at the head of the Copper River, including adjacent parts of the Nabesna River Valley, and parts of the Porcupine River Valley from the international boundary westward to the junction of the Porcupine and Yukon Rivers.

Office work.—After completion of field work each season much office and laboratory work is required in analyzing the specimens collected, identifying by microscopic and other means the rocks and minerals found, perfecting the field sketches and drawings, and interpreting the various geologic phenomena observed, so that the significant facts may be revealed and intelligibly expressed by maps and reports. It is usually reckoned that these office studies require about twice as long as the original field work.

An office project not directly related to new field work but requiring familiarity with the mining industry of Alaska is the annual canvass of the

production of minerals from the Territory. This project involves analysis and tabulation of returns from mine operators throughout the Territory as to their year's output of all minerals of value and the checking of these results with information from other sources, making possible complete and correct records of the amount of each kind of mineral produced, the districts from which it came, and the new developments that have taken place or are in prospect. This work has been completed for the year 1938 and the results prepared for publication; the canvass for 1939 is under way.

Reports and maps.—During the year six reports containing maps, six special maps (including two new editions and four reprints), and three press statements have been published. Nine reports containing maps, three special maps, and new editions of three maps are in course of publication. In addition, three reports, one map, and a reprint of one map are partly prepared. Three papers prepared by personnel of the Alaskan Branch were approved for outside publication.

TOPOGRAPHIC BRANCH

The headquarters office of the Topographic Branch and of the Atlantic and Central divisions is located at Washington; the headquarters office of the Pacific division is at Sacramento, Calif. Section offices were maintained at Denver, Colo., Rolla, Mo., and Chattanooga, Tenn.

GENERAL OFFICE WORK

Necessary office work incidental to the field work of the Topographic Branch consisted of the computation and adjustment of the results of control surveys, photoplanimetric compilation, and the inking, inspection, and editing of the completed topographic field sheets prior to their submission for reproduction.

Section of Computing.—In addition to the routine adjustment of primary control, the volume of which was above the average, owing to the demands for Public Works Administration projects, progress was made in a general readjustment of older control surveys to refer them to the standard datums of the United States.

During the year four bulletins reporting the results of control surveys were published, and manuscripts for six more were prepared. About 1,600 letters were written supplying engineers throughout the country with the description and figures for marks established by leveling, traverse and triangulation, and other miscellaneous correspondence.

Section of Photomapping.—Aerial photographs of which field interpretation had been made were used for the compilation of planimetric bases of fifteen $7\frac{1}{2}'$ quadrangles or parts of quadrangles in Louisiana, fourteen $7\frac{1}{2}'$ quadrangles or parts of quadrangles in Michigan, and ten $15'$ quadrangles or parts of quadrangles in Wisconsin, covering a total of 2,180 square miles.

Line bases to assist in topographic mapping were compiled by the radial-line method of ten $7\frac{1}{2}'$ quadrangles or parts of quadrangles in Michigan, covering in all 378 square miles. Four $7\frac{1}{2}'$ quadrangles in Massachusetts and two in Rhode Island, covering in all 194 square miles, were compiled with the aerocartograph, making a grand total of 572 square miles covered by line map bases. Topographic mapping of 117 square miles in Montana was executed by the stereo-photogrammetric method in the Washington office. Sixteen square miles in Virginia were likewise mapped for experimental purposes. Of the photographs used in photomapping, covering areas totaling 34,278 square miles, those covering 22,426 square miles were purchased from commercial firms, and those covering 11,852 square miles were purchased or borrowed from other Government agencies.

Cartographic Section.—Work on the United States part of the map of the world on the scale of 1:1,000,000 was continued. Sheet J18, Chesapeake Bay, is in progress. For the Bureau of Public Roads the work of preparing the Transportation Map of the United States was continued. Compilation and inking were in progress on 90 sheets. Proofreading and checking was done on 39 sheets. Maps of three States, comprising 25 sheets, were published or in proof, and maps for two States, comprising 16 sheets, were in course of publication.

Section of Inspection and Editing.—During the year, 51 new topographic maps were prepared for photolithographs as two-color advance sheets and 77 as planimetric maps. Ninety-eight new topographic maps were edited for publication, 38 of which were for three-color lithographs, and 60 for engraving. The preparation of quadrangle maps for reprinting is a large item in the work of the section. Three hundred and sixty quadrangle maps, 11 State maps, and eight State index maps were prepared and edited for reprint editions. Editing was also completed on 158 maps published as illustrations, a total of 635 maps edited.

First, second, combined, and woodland proofs of new topographic maps and reprints numbering 309 and proofs of maps reproduced by photolithography in one or more colors, numbering 166, were read. On June 30, 223 topographic maps were in process of engraving and printing, 57 were awaiting lithography, and 35 were in preparation; 79 were on the editing docket in different stages of editing.

For the Conservation Branch the work of preparing river surveys for publication was continued. Work was executed on 31 different projects. The maps of 22 projects, comprising 89 separate sheets, were transmitted for lithography during the year. For the Tennes-

see Valley Authority three maps were prepared and transmitted for reproduction and proofs of nine maps were read.

In addition to the routine work outlined above, many original sheets were inked for the Atlantic division, and about 1,400 replies to letters of inquiry were prepared.

MAP INFORMATION OFFICE

Since January 1920, when the Map Information Office, authorized by Executive Order of December 30, 1919, was organized, it has functioned entirely through Geological Survey personnel.

The files of the office contain samples of practically all types of maps published by the Federal mapping agencies, many maps of foreign governments and commercial map publishers, catalogs and index maps, and a card index for reference, which is much used by Government agencies and the general public. The office has also been given the task of collecting, classifying, and disseminating information concerning all aerial photography throughout the United States, of both Federal and non-Federal character.

Work done by the Map Information Office for the Federal Board of Surveys and Maps includes the writing of minutes of all its meetings and the handling of all correspondence relating to the Board.

FIELD SURVEYS

Work was done in 45 States and in Puerto Rico. Cooperative projects were conducted in 16 of these States, in Puerto Rico, and with the Tennessee Valley Authority.

The art of making topographic maps from aerial photographs by the use of stereophotogrammetric methods is gaining in favor. It has been proved conclusively that this method is adaptable, with added economy and speed, to areas of moderate to great relief. By a cooperative agreement with the Tennessee Valley Authority, the Geological Survey is mapping areas within the Tennessee River Basin by these methods. On June 30, 28 Geological Survey people were employed on this project. Fifteen complete stereophotogrammetric units are installed and in use at Chattanooga.

Of the total area of the United States, 45.4 percent has been covered by topographic maps.

WORK OF THE YEAR BY STATES

Alabama.—The 7½' quadrangles Cleveland, Daphne, Duckers Bay, Hollingers Island, and Mobile completed and Theodore and Wheelerville begun.

Arizona.—The 15' quadrangles Bitter Well, Galiuro Mountains, Ruby, and Twin Buttes completed and Chloride and Tubac begun.

Arkansas.—The 15' quadrangles Snowball and Waldron completed and Antoine begun. In cooperation with the Geological Survey of Arkansas, the 15' quadrangle Lonoke completed and the 7½' quadrangle Scott No. 4 begun.

California.—The 15' quadrangles Arroyo Grande and San Luis Obispo and the 7½' quadrangles La Jolla Northeast, La Jolla Northwest, La Jolla Southwest, and San Diego Northwest completed, and the 15' quadrangles Cayucos, Cuyamaca, El Cajon, Jamul, and Port San Luis and the 7½' quadrangles La Jolla Southeast and San Diego Northeast begun. In cooperation with the State engineer of California, the 7½' quadrangles Redlands Northwest, Redlands Southwest, Redlands Southeast, and Riverside Northeast completed and Riverside Northwest begun.

Colorado.—The 15' quadrangles Mount Lincoln and Mount Gunnison completed, Castle Rock, Elbert, Elizabeth, and Palmer Lake resumed, and Garfield and Pitkin begun. An extension to the Black Canyon of the Gunnison National Monument was begun. In cooperation with the city of Denver, the cultural revision within the city limits of Denver, and the 7½' quadrangles Diamond K Ranch, East Lake, Lafayette, Fitzsimons, Golden, Marshall, and Morrison completed and the Littleton continued.

Connecticut.—The 7½' quadrangles Lyme completed and Essex begun.

Delaware.—The 7½' quadrangle Marcus Hook (Pa.-N.J.-Del.) completed and the 15' quadrangle Elkton (Md.-Del.) begun.

Florida.—The 15' quadrangles Arran and Tallahassee begun.

Georgia.—The 15' quadrangles Adairsville and Waleska and the Pine Log area begun.

Idaho.—The 30' quadrangle Riggins completed. The 15' quadrangles Headquarters and Pauline completed, Garns Mountain begun, and Wallace special area continued.

Illinois.—The 15' quadrangles Milford completed and Cissna Park and Fithian begun. In cooperation with the Department of Registration and Education of Illinois, Geological Survey, the 15' quadrangles Freeport, Ina, and Mulberry Grove continued.

Indiana.—The 7½' quadrangles Lewis, Pimento, and Terre Haute completed and Marshall Northeast, Marshall Southeast, Seeleyville, and Sullivan Northeast begun. In cooperation with the Department of Conservation of Indiana, the 7½' quadrangles Angola East, Bethlehem, Borden, Clear Lake, Coal City, Georgetown, Hamilton, Jasonville, Linton, Madison East, Madison West, Metz, and Switz City completed and Brooksbury, Turkey Lake Northeast, and Turkey Lake Southeast begun.

Iowa.—The 15' quadrangles Centerville and Forbush begun.

Kansas.—The 15' quadrangle Scott City completed and the 15' quadrangles Modoc and Sandon and the 7½' quadrangle Sandon Northwest begun. In cooperation with the Geological Survey of Kansas, the 15' quadrangles Altoona completed and the Severy begun.

Kentucky.—The 7½' quadrangles Hiatt completed and Fenton and Hico begun.

Louisiana.—The 15' quadrangles Baratavia, Cut Off, Dime, Dulac, Gibson, Houma, Lac des Allemands, Lake Felicity, Pointe a la Hache, Quarantine, and Shell Beach completed. In cooperation with the Louisiana Board of State Engineers, planimetric maps completed for the 7½' quadrangles Chopin Northeast, Chopin Northwest, Chopin Southwest, Chopin Southeast, Crichton Northeast, Crichton Northwest, Crichton Southwest, Crichton Southeast, Hama North-

east, Hanna Northwest, Hanna Southwest, Hanna Southeast and begun for the 15' quadrangles Frierson and Poole.

Maine.—The 15' quadrangles Grand Isle completed and Amity and Danforth begun. An extension and cultural revision completed for Acadia National Park.

Maryland.—The 15' quadrangle Elkton (Md.-Del.) begun.

Massachusetts.—The 7½' quadrangles Attleboro (Mass.-R. I.) and East Providence (Mass.-R. I.) begun. In cooperation with the Department of Public Works, Division of Waterways, the 7½' quadrangles Cotuit, Fall River (Mass.-R. I.), Franklin (Mass.-R. I.), Hampden, Holliston, Hyannis, Ludlow, Medfield, Pawtucket (R. I.-Mass.), Sterling, Tiverton (R. I.-Mass.), Wachusett Mountain, and Wrentham completed and Belchertown 7½' and Lowell 7½' begun.

Michigan.—The 15' quadrangles Blissfield and Dundee begun. In cooperation with the State Highway Department of Michigan, the 7½' quadrangles Belle Isle, Detroit, Grosse Pointe, and Highland Park completed and Dearborn, Redford, and Royal Oak begun. In cooperation with the Department of Conservation of Michigan, planimetric maps completed for the 7½' quadrangles Ballentine Southwest, Copper Harbor Northeast, Copper Harbor Northwest, Copper Harbor Southwest, Delaware Mine Northeast, Delaware Mine Northwest, Delaware Mine Southwest, Delaware Mine Southeast, Eagle River Northeast, Eagle River Southwest, Eagle River Southeast, Manitou Island, and Traverse Point.

Minnesota.—The 15' quadrangles Drayton (N. Dak.-Minn.), Hallock, Kennedy, and Pembina (Minn.-N. Dak.) begun.

Mississippi.—The 15' quadrangles Denmark and Oxford begun.

Missouri.—The 15' quadrangles Kirksville, New Bloomfield, and Tarkio and the 7½' quadrangle Jefferson City completed and the 15' quadrangles Farragut and Hamburg begun. In cooperation with the Geological Survey and Water Resources of Missouri, the 15' quadrangles Darlington, Doniphan, Fordland, Gatewood, Sweet Springs, Topaz, and Vera and the 7½' quadrangles Caplinger Mills, Cedar Hill, Eldorado Springs, Eldorado Springs South, Eureka, Monegaw Springs, Osceola, Roscoe, Stockton 1c, Stockton 2c, Taberville, Vista, and Worland completed; the 15' quadrangles Acorn, Bolckow, Brussels, Gentry, Stanberry, and Wellsville and the 7½' quadrangles Moundville, Nevada 1b, and Nevada 1c begun and the 15' quadrangle Long Lane continued.

Montana.—Revision of the Glacier National Park completed. Little Rocky Mountains area and Philipsburg District completed. The 15' quadrangles Mount Cowen and Mount Wallace continued and Sunburst begun.

Nebraska.—An extension to Scotts Bluff National Monument completed and Republican River, Sheets 2, 3, 5, 6, and 7 completed and Sheets 8 and 9 begun.

Nevada.—The 15' quadrangles Cortez completed and Owyhee continued and the Cosgrave area begun.

New Hampshire.—The 15' quadrangle North Conway begun.

New Jersey.—The 7½' quadrangles Marcus Hook (Pa.-N. J.-Del.) and South Amboy completed and New Brunswick begun.

New Mexico.—The 15' quadrangles Carlsbad, Hackberry Lake, Jemez, Pajarito Peak, and Salt Lake completed and La Ventana and Nacimiento Peak begun.

New York.—The 15' quadrangles Plattsburg (N.Y.-Vt.), Rouses Point (N.Y.-Vt.) and Willsboro (N. Y.-Vt.) begun. In cooperation with the Department of Public Works of New York, the 7½' quadrangles East Syracuse and Haverstraw completed and Syracuse begun.

North Carolina.—Cape Hatteras National Park and the 15' quadrangles Lake Drummond (Va.-N. C.), Moyock (Va.-N. C.), and Raleigh begun.

North Dakota.—The 15' quadrangles Bathgate, Drayton (Minn.-N. Dak.), and Glasston begun. In cooperation with the Geological Survey of North Dakota, the 15' quadrangles Aylmer completed and Selz begun.

Oklahoma.—The 15' quadrangles Fort Reno completed and Geary begun; the 7½' quadrangles Geary Northeast, Fort Reno Northeast, Fort Reno Northwest, Fort Reno Southwest, and Fort Reno Southeast begun.

Oregon.—The 15' quadrangles Mount Popocatepetl completed and Yaquina begun.

Pennsylvania.—The 7½' quadrangles Bridgeport and Marcus Hook (Pa.-N. J.-Del.) completed. In cooperation with the Department of Internal Affairs of Pennsylvania, Topographic and Geologic Survey, the 15' quadrangles Mifflinburg completed, Orbisonia and Sayre begun, and the cultural revision completed for the 15' quadrangles Punxsutawney and Smicksburg and begun for Curwensville.

Puerto Rico.—In cooperation with the Commissioner of the Department of the Interior of Puerto Rico, the 7½' quadrangles Alto Sano, Camuy, Mayaguez, Rincon, and San Sebastian completed and Bayamon and Hormigueros begun.

Rhode Island.—The 7½' quadrangles Fall River (Mass.-R. I.), Franklin (Mass.-R. I.), Pawtucket (R. I.-Mass.), Sakonnet Point, and Tiverton (R. I.-Mass.) completed and Bristol and Prudence Island begun.

South Carolina.—The 15' quadrangles Florence and Timmons ville begun.

South Dakota.—The 15' quadrangles Pukwana completed and Lyonville and Tinton and Vicinity begun.

Tennessee.—The 7½' quadrangles Bulls Gap completed and Baileyton and Neddy Mountain begun. For the Tennessee Valley Authority, the 7½' quadrangles Arondale, Benton, Blountville (Tenn.-Va.), Bluff City, Burem, Chuckey, Church Hill (Tenn.-Va.), Clevenger (Tenn.-Va.), Greeneville, Indian Springs (Tenn.-Va.), Jearoldstown, Jonesboro, Kingsport (Tenn.-Va.), Leesburg, Lee Valley, Lovelace, McCloud, Mohawk, Morristown, Mosheim, New Market, Plum Grove (Tenn.-Va.), Pressmans Home, Russellville, Springvale, Spurgeon, Stony Point, Sullivan Gardens, and Telford completed and Cedar Creek, Johnson City, Lake Davy Crockett, Parrottsville, Robbinsville, and Spring City begun.

Texas.—The 15' quadrangles Big Spring South, Cline, Clint, Fort Bliss, Hueco Tanks, Morita, Tornillo, Turkey Mountain, and Ysleta and the 7½' quadrangle El Paso completed.

Utah.—Zion National Monument and Bull Valley area completed. The 15' quadrangles Monroe continued and Soldier Summit begun.

Vermont.—The 15' quadrangles Plainfield, Plattsburg (N. Y.-Vt.), and Willsboro (N. Y.-Vt.) begun. In cooperation with the State geologist of Vermont, the 15' quadrangle St. Johnsbury completed.

Virginia.—The 15' quadrangles Lake Drummond (Va.-N. C.) and Moyock (Va.-N. C.) begun. For the Tennessee Valley Authority, the 7½' quadrangles Blountville (Tenn.-Va.), Church Hill (Tenn.-Va.), Gate City, Hilton, Indian Springs (Tenn.-Va.), Kingsport (Tenn.-Va.), Mendota and Plum Grove (Tenn.-Va.) completed. In cooperation with the Conservation Commission of Virginia, Geological Survey, the 15' quadrangles Front Royal completed and Berryville, Clarksville, Hightown, and Rustburg begun.

Washington.—Kittitas Drainage District completed. In cooperation with the Director of the Department of Conservation and Development, the 15' quadrangles Yakima Northwest completed and Yakima Northeast begun.

Wisconsin.—The 15' quadrangles Red Wing completed and Maiden Rock and Menomonie begun. In cooperation with the State Highway Commission of Wisconsin, planimetric maps completed for the 15' quadrangles Alvin, Beechwood, Bessemer, Lac du Flambeau, Marenisco, Minocqua, Phelps, Star Lake, Trout Lake, and Winchester and begun for Pike Lake.

Wyoming.—The 15' quadrangle Mount Bonneville and an extension to Grand Teton National Park completed. The 30' quadrangle Big Piney continued. Fossil Special begun.

WATER-RESOURCES BRANCH

The importance of water and of systematic published records of the quantity, chemical quality, and availability of both surface and ground waters increases each year. The growth of the country in population, industry, and agriculture, with consequent increases in the demands for water, and especially the continued series of dry years that included the disastrous and widespread droughts of 1934 and 1936, and the many recently disastrous floods on streams, large and small, in different parts of the country, have impressed on the public the importance of water as a controlling factor in many of man's activities. The information collected by the Geological Survey is used extensively by numerous Federal and State agencies and by many private organizations and individuals, and is found to be invaluable in studies of projects of all classes and in all parts of the country. The work of the Water Resources Branch thus occupies a position of great importance in the economic affairs of the Nation.

As set forth below, the investigations by the Branch are conducted largely in cooperation with Federal bureaus, State, county, municipal, and other governmental agencies, and permittees and licensees of the Federal Power Commission.

Federal bureaus.—Water-resources investigations were conducted for the following Federal bureaus: The Bureau of Biological Survey, the Soil Conservation Service, the Weather Bureau, the Forest Service, the Bureau of Agricultural Economics, and the Flood Control Committee, of the Department of Agriculture; the Office of Indian Affairs, the Bureau of Reclamation, the National Park Service, the Division of Grazing, and the Division of Territories and Island Possessions, of the Department of the Interior; the Bureau of Prisons, of the Department of Justice; the Department of State; the Federal Power Commission; the Public Health Service; the National Resources Committee; the Securities and Exchange Commission; the Tennessee Valley Authority; the Office of the Chief of Engineers and

the Mississippi River Commission, of the War Department; and the Bureau of Naval Ordnance, of the Navy Department.

States.—Amounts aggregating approximately \$870,000 were made available by States and municipalities for cooperative water-resources investigations. In addition to these amounts it is estimated that individuals and other organizations furnished data and records having an estimated value of more than \$208,000.

Permittees and licensees of the Federal Power Commission.—At the request of the Federal Power Commission, 29 engineers of the Branch have been designated as representatives of the Commission to perform such field work as may be assigned to them by the Commission. About 295 gaging stations were operated by the Branch or by permittees and licensees under the supervision of the Branch in connection with 118 projects of the Federal Power Commission. Engineers of the Branch have had field supervision of the operation of 160 projects under permits and licenses of the Federal Power Commission.

Division of Surface Water.—The Division of Surface Water, through 37 district offices, conducts investigations of surface water, which consist in the measurement of the stages and discharges of rivers in all the States except Delaware, in the District of Columbia, and in Hawaii at selected gaging stations. In this work 45 States, the Territory of Hawaii, and several Federal bureaus cooperated in the maintenance of the 4,165 gaging stations, 2,992 of which are equipped with water-stage recorders, that were in operation at the end of the year. During the year 764 gaging stations were established and 430 were discontinued. The total number of gaging stations includes about 700 stations on canals, ditches, lakes, reservoirs, and rivers where stages only are measured, the records at these stations being of particular value in connection with water utilization, water storage, and flood protection. Some of these 700 stations are equipped with recorders. Records for 132 additional gaging stations were received from Federal Bureaus and from individuals. There were 47,894 regular and 4,621 miscellaneous discharge measurements made during the year, and 16 reports containing records of flow of streams in various sections of the United States and in Hawaii were completed and transmitted to the Government Printing Office. The printer delivered 4 of these reports and also 14 reports that were transmitted to him during the previous year.

Division of Ground Water.—The Division of Ground Water investigates the waters that lie below the surface in the zone of saturation, from which wells and springs are supplied; the source, occurrence, quantity, and head of these waters; their conservation; their avail-

ability and adequacy for domestic, industrial, irrigation, and public supplies and as watering places for livestock and desert travelers; and the methods of constructing wells and recovering water from them and of improving springs. The constantly increasing use of water supplies from wells is causing a greater demand each year for intensive studies of the quantities of ground water that are perennially available. Work was done in 37 States and in Hawaii and the Virgin Islands, nearly all in cooperation with Federal, State, Territorial, or local governmental agencies.

During the year about 75 technical reports or papers relating to ground water were released to the public in printed, mimeographed, or typewritten form. Twenty technical papers were presented by members of the Division before scientific societies and other organizations.

Periodic measurements of water levels or artesian pressure were made in about 5,000 observation wells, on about 200 of which recording gages were maintained. The report on water levels and artesian pressure in observation wells in the calendar year 1937 was published, and a similar report for 1938 is in press. Tests on 86 water-bearing materials were made in the hydrologic laboratory.

Division of Quality of Water.—The Division of Quality of Water analyzed water from surface and underground sources with reference to their suitability for industrial and agricultural uses and for domestic use (not related to questions of health) so far as such use is affected by the dissolved mineral matter. Analyses, partial or complete, of 1,895 samples of water were made in the laboratory in Washington, D. C. The analyses included some for many of the regular studies of ground water in the different States and for most of the special investigations on water supplies for specific projects. A laboratory was operated at Roswell, N. Mex., for work on the salt content of the Pecos River. One chemist was stationed at Austin, Tex., for analytical work and consultation on ground-water problems, and another for most of the year at a new laboratory set up in Boise, Idaho, for determination of suspended matter in samples collected for measurements of silt loads. Close cooperation was continued with the Division of Ground Water in the study of problems relating to quality of ground water and in the preparation of the parts of ground-water reports that involve consideration of the chemical character of the waters.

Studies of suspended and dissolved matter of the Colorado River and its tributaries were continued. Special attention was given to the composition of the water at different depths at points in Lake Mead. On four demonstration projects of the Soil Conservation

Service, studies of silt movement which were started as a Public Works project were continued. Studies of silt movement in streams in the Boise River Basin in Idaho and in the St. Francis River Basin in Missouri were started for the Flood Control Coordinating Committee of the Department of Agriculture.

During the year water analyses were made for the Conservation Branch and the Geologic Branch of the Survey, for the National Park Service of this Department, for the Department of Agriculture, the War Department, the Navy Department, the Public Health Service, the Securities and Exchange Commission, and the District of Columbia. The Division furnished information and advice on problems relating to quality of water to the Public Works Administration, the Reconstruction Finance Corporation, and the Federal Housing Administration.

During the year seven technical papers were presented by members of the Division before scientific societies.

In connection with the work of a committee of the American Water Works Association on the determination of fluoride, detailed analyses were made of 5 samples of water from three States, and the fluoride content was determined in 22 samples from 16 States.

Division of Power Resources.—The Division of Power Resources compiled, by States, information on the capacity of all water wheels in water-power plants in the United States of 100 horsepower or more as of January 1, 1939.

Information was prepared for the use of a subcommittee of the National Resources Committee appointed to prepare a report on national energy resources requested by the President.

Assistance was furnished to the Conservation Branch of the Survey in the preparation of a revision of the report on the potential water power of the world.

Division of Water Utilization.—The Division of Water Utilization conducted hydrologic studies and compiled data relating to the utilization and control of the waters of streams. The Division performed administrative functions for the supervision and investigation of hydrologic problems and for the work conducted by the field organization of this Branch pertaining to power projects of the Federal Power Commission and the Department of the Interior.

Through Public Works funds, special studies and compilations of information pertinent to floods and droughts were organized and supervised by the Division and conducted in the field offices of the Branch. Supervision was also provided for a project conducted by the Works Progress Administration at Pittsburgh, Pa., which in-

volved compilations of topographic characteristics that relate to flood flows from certain drainage basins.

The investigations of the water problems along the boundary between the United States and Canada were continued for the State Department and the International Joint Commission. The Division supervised and coordinated the collection by the district offices of the Division of Surface Water of special stage and discharge data relative to outstanding floods, particularly those of August 1935 in Ohio, of 1937-38 in California, and of September 1938 in the north-eastern States. These flood data, with other information concerning notable floods, have been assembled and reports have been submitted for publication or are in preparation. The reports published during the year related to the major Texas floods of 1935, the floods of the Ohio and Mississippi Rivers in January and February 1937, floods in the Canadian and Pecos River Basins of New Mexico in May and June 1937. An inventory of unpublished hydrologic data was issued.

During the year a file or depository of information on floods was established in the Division in accordance with recommendations of the committee on flood-protection data of the American Society of Civil Engineers.

The activities of the Division have made possible the compiling and studying of hydrologic data, which have been collected predominantly by the Water-Resources Branch, in such a manner as to develop significant fundamental principles and facts regarding run-off and stream-flow characteristics. This information is essential and is being used currently in the determination of wise public policy in the application of flood-control measures and land-use practices.

WORK OF THE YEAR BY STATES

The work listed by States was done in part with funds appropriated to the Geological Survey, in part with funds furnished by cooperating States and municipalities, and in part with funds furnished by other Federal bureaus and agencies.

Alabama.—The State Geologist, the Mobile Army Engineer office, and licensees of the Federal Power Commission cooperated in operating 58 gaging stations. Analyses were made of well waters from Coffee County for a report on possible relation between the composition of water and the incidence of tuberculosis.

Arizona.—The State Water Commission and other agencies cooperated in operating 52 gaging stations. A report on ground water in the Holbrook region was published. Investigations of ground-water conditions were made in the upper Gila Valley for the Office of Indian Affairs and in the southeastern part of the State for the Division of Grazing. Water analyses and silt-load measurements were made for the Colorado River at Grand Canyon and at Willow

Beach; samples were obtained daily at both stations. Analyses were made of samples collected at regular intervals from Lake Mead.

Arkansas.—The State Geologist and other State and Federal agencies cooperated in operating 28 gaging stations. The study of the annual pumpage and resultant fluctuations in ground-water levels in the Grand Prairie region was continued. A study of 10 years of ground-water records was released.

California.—The State Department of Public Works and other State, municipal, and county agencies, and various Federal Bureaus cooperated in operating 290 gaging stations. Observation wells were maintained in different areas. A paper on infiltration from rain and irrigation water on the Victor alluvial plain in the Mokelumne area was released.

Colorado.—Work was continued in cooperation with the State Engineer, and 196 gaging stations were operated. Funds were also contributed by the Little Rock Army Engineer office. An investigation of the deep well in Mesa Verde National Park was made for the National Park Service. Ground-water investigations were made for the Grazing Division. Analyses were made of water samples from the Colorado River at Grand Junction and Cameo and from the Gunnison River at Grand Junction.

Connecticut.—The State Water Commission and various municipal and Federal agencies cooperated in operating 34 gaging stations. Records of water levels in observation wells and of the salt content of the water in wells near the coast were obtained and released. Supervision was maintained of an investigation and report on the salinity of the Connecticut River, including about 150,000 determinations of chloride in samples collected since 1934. Analyses were made of 24 samples of ground water from wells near the coast.

Florida.—The State Road Department and other State, municipal, and Federal agencies cooperated in operating 56 gaging stations. Ground-water investigations were continued, and progress was made on the reports on the Jacksonville area and the area west of the Suwannee River.

Georgia.—The State Department of Natural Resources and various Federal agencies cooperated in operating 68 gaging stations. Ground-water investigations were begun in the Savannah area and other parts of the Coastal Plain. Analyses were made of water samples collected at two gaging stations. Samples were collected, and substantial progress was made on the preparation of a report on the salinity of the water of the Savannah River.

Hawaii.—The Territory of Hawaii cooperated in surface-water and ground-water investigations and in the operation of 115 gaging stations. Special attention was given to the use of geophysical methods in connection with ground-water studies. Records of wells on Oahu, a geologic map and guidebook of the Island of Oahu, and a general paper on the ground-water resources of the Territory were prepared for publication.

Idaho.—The State Department of Reclamation, the State Water Conservation Board, and other State and Federal agencies cooperated in operating 302 gaging stations. Reports on the ground-water resources of the Snake River Plain and the Mud Lake and Island Park areas were published. A laboratory was set up at Boise and used for the determination of suspended matter in 10,232 samples collected between January 15 and June 30 in connection with measurements of silt loads for the Flood Control Coordinating Committee of the Department of Agriculture.

Illinois.—The State Department of Registration and Education and other State and Federal agencies cooperated in operating 50 gaging stations. A

reconnaissance was made of ground-water conditions in the East St. Louis area.

Indiana.—The State Department of Public Works and other State, municipal, and Federal agencies cooperated in operating 39 gaging stations. An investigation of ground water in the Indianapolis area was made, and a State-wide observation-well program was conducted.

Iowa.—The Iowa Geological Survey and other State and Federal agencies cooperated in operating 59 gaging stations. An investigation of the ground-water supplies of the State and a study of the effects of soil-conservation measures on the ground-water levels were undertaken.

Kansas.—The State Board of Agriculture and other State, municipal, and Federal agencies cooperated in operating 48 gaging stations. Ground-water investigations in the Wichita and Winfield areas and on the High Plains and water-level measurements in wells in the Mankato area were made. A report on the ground-water resources of the Arkansas Valley in Ford County and several brief papers on ground water were released.

Kentucky.—The State Department of Highways and the Huntington, Louisville, and Nashville Army Engineer offices cooperated, and 45 gaging stations were in operation at the end of the year.

Louisiana.—The State Department of Conservation, the State University, and the Mississippi River Commission cooperated in operating 34 gaging stations. An investigation of the ground-water resources was conducted in Rapides, Arcadia, Jefferson Davis, Avoyelles, Grant, and LaSalle Parishes. A general paper on ground-water supplies in Louisiana was prepared for publication. Partial analyses of 76 samples and detailed analyses of 10 samples of ground water were made.

Maine.—The Maine Public Utilities Commission cooperated in surface-water investigations and in the operation of 36 gaging stations.

Maryland.—The State Geologist and several municipal and Federal agencies cooperated in operating 29 gaging stations. An investigation and reports on the ground-water supply at Indian Head were made, including analyses of 9 samples of water from wells. Records of water levels in a well in Montgomery County were obtained. Three samples from wells at Laurel were analyzed.

Massachusetts.—The State Department of Public Works and other State and Federal agencies cooperated in operating 38 gaging stations in Massachusetts and 1 in Rhode Island. Ground-water investigations were made in the Lowell area.

Michigan.—The State Stream Control Commission cooperated in operating 45 gaging stations. Informal cooperation on the observation-well program was continued with the Geological Survey Division.

Minnesota.—The State Division of Drainage and Waters and several Federal agencies cooperated in operating 301 gaging stations.

Mississippi.—The Mississippi Geological Survey and several Federal agencies cooperated in operating 49 gaging stations. An investigation of ground-water resources was undertaken in the alluvial plain of the Mississippi Valley and in the coastal area.

Missouri.—The Missouri Geological Survey and Water Resources and other State, municipal, and Federal agencies cooperated in operating 102 gaging stations. The observation-well program in the Tarkio area was continued and 2,850 samples from 2 streams in and near the Tarkio project of the Soil Conservation Service were examined for silt content. The silt content was determined for 1,600 samples from streams in the St. Francis River Basin.

Montana.—The State Engineer, the State Water Conservation Board, and several Federal agencies cooperated in operating 155 gaging stations. The observation-well program was continued in the lowlands at the head of Flathead Lake.

Nebraska.—The State Engineer and other State and Federal agencies cooperated in operating 59 gaging stations. The State-wide observation-well program was continued, and ground-water investigations were made, chiefly in Box Butte County. A report on ground water in the Grand Island area and several brief papers on ground water were released. Analyses of 21 samples of ground water were made as part of the cooperative studies.

Nevada.—The State Engineer and municipal, county, and Federal agencies cooperated in operating 13 gaging stations. An investigation and a report were made on the artesian water supply in the Las Vegas area, with special reference to leakage of artesian wells.

New Hampshire.—The New Hampshire Water Resources Board cooperated in surface-water investigations and in the operation of 29 gaging stations.

New Jersey.—The State Water Policy Commission and other State and Federal agencies cooperated in operating 80 gaging stations. The program of observation wells begun in 1923 was continued, and intensive ground-water investigations were made, especially in regard to salt-water intrusion and artificial recharge. The regular semiannual examination of ground water from the Atlantic City region was continued, and the chloride content of 120 samples was determined. The chloride content of samples collected monthly from 10 wells in the Parlin area (90 samples) was determined.

New Mexico.—The State Engineer, the Interstate Stream Commission, and other State and Federal agencies cooperated in operating 160 gaging stations. Ground-water investigations were made and reports were released or prepared for publication on the shallow-water resources of the Roswell Basin, the ground-water supplies of the Middle Rio Grande, Mimbres, and Portales Valleys, Lea County, the Jicarilla and Zuni Indian Reservations, and the vicinity of Los Lunas. Ground-water investigations were conducted in the Hot Springs area and at the Conchas Dam. Analyses were made in the Washington laboratory of 42 samples from the Rio Grande and tributaries, of 14 samples collected at Conchas Dam, and of 386 samples from the Pecos River. In the Roswell laboratory analyses were made of 10-day composites of daily samples from 7 stations and of 1,277 single samples. In the Albuquerque laboratory analyses were made of 1,240 samples of water from the Pecos River. A preliminary statement on the chemical character of Pecos River in New Mexico, 1937-38, was prepared for use in connection with plans for further study of the river water.

New York.—The State Water Power and Control Commission and other State, county, municipal, and Federal agencies cooperated in operating 150 gaging stations. Ground-water investigations were continued on Long Island and in Croton Valley. Several reports on ground water were released.

North Carolina.—The State Department of Conservation and Development and several Federal and municipal agencies cooperated in operating 102 gaging stations. The study of methods of developing wells and the program of water-level measurements in wells in different parts of the State were continued. During the year 3,360 samples were collected for determination of silt in 3 streams near High Point in connection with the demonstration project of the Soil Conservation Service.

North Dakota.—The State Engineer and other State and Federal agencies cooperated in operating 31 gaging stations. A study of the Dakota artesian basin and a State-wide observation-well program were continued.

Ohio.—The Ohio Cooperative Topographic Survey and other State, municipal, county, and Federal agencies cooperated in operating 93 gaging stations. An investigation of ground-water supplies of Butler and Hamilton Counties, in the Cincinnati area, was continued, and records of water levels and pumpage from wells in the Canton area were obtained.

Oklahoma.—The Oklahoma Planning and Resources Board and other State, municipal, and Federal agencies cooperated in operating 30 gaging stations. A report on the ground-water resources of Texas County was released, and investigations were begun in Cimarron County. Water-level measurements were made in the three Panhandle counties and in the Stillwater area. Partial analyses were made of 44 samples, and detailed analyses were made of 4 samples of ground water collected in Cimarron County as a part of the cooperative studies.

Oregon.—The State Engineer and other State, municipal, and Federal agencies cooperated in operating 213 gaging stations. A report on the ground-water resources of the Willamette Valley was completed, and the program of water-level measurements in observation wells was continued. The geology of dam sites in the Willamette Valley was investigated for the Army Engineers.

Pennsylvania.—The State Department of Forests and Waters and other State, municipal, and Federal agencies cooperated in operating 114 gaging stations. Reports on ground water in the south-central and the north-central parts of the State were prepared for publication. The program of water-level measurements in observation wells was continued. At the request of the Pennsylvania Turnpike Commission a study was begun of the waters encountered in the tunnels of the old railroad line that is being generally followed by the turnpike to determine the chemical character in its relation to probable effects on construction materials, the results being used as a guide in the preparation of specifications for tunnel linings and grouting and for pipe.

South Carolina.—The State Highway Department and several municipalities and Federal agencies cooperated in operating 31 gaging stations. The study of ground-water levels in the Tyger River area was continued.

South Dakota.—The Kansas City Army Engineer office and the Department of Agriculture cooperated in surface-water investigations and in the operation of 22 gaging stations.

Tennessee.—The State Division of Geology and several Federal agencies cooperated in operating 104 gaging stations. Records were obtained of the current pumpage and water levels in observation wells in Memphis. Detailed analyses of 30 samples of well waters from Giles County were made in connection with a study by the Public Health Service of tuberculosis, and a report was prepared on the relation between the composition of water and the incidence of tuberculosis in the county.

Texas.—The State Board of Water Engineers and several municipalities and Federal agencies cooperated in operating 139 gaging stations. Ground-water investigations were continued and reports were released on ground water on the High Plains and in the Houston, San Antonio, Big Spring, Balmorhea, and Seadrift areas. A report on ground water in the Texarkana area was made for the Department of Justice. Reports giving the results of water-well and spring inventories in the following counties were prepared in cooperation with the Works Progress Administration: Hartley, Hidalgo, Hays, Oldham, Deaf

Smith, Dawson, Carson, Collingsworth, Waller, Montgomery, Harris, Grimes, Fort Bend (east of Brazos), Brazoria (east of Brazos), Galveston, Gonzales, Ochiltree, and Edwards. During the year 5,303 water samples were analyzed.

Utah.—Surface and ground-water investigations were continued in cooperation with the State Engineer, and 74 gaging stations were operated. In the ground-water studies special attention was given to the fluctuation of water levels in wells with precipitation and with pumpage or artesian flow, and to the effects of the conservation program administered by the State Engineer. Several papers relating to ground water in the State were released. Analyses were made of 36 composites of daily samples from the San Juan River near Bluff. Determinations were made of the total dissolved solids in composites of daily samples collected from the Colorado River at Cisco and from the Green River at Greenriver.

Vermont.—Surface-water investigations were continued in cooperation with the State, and 29 gaging stations were operated.

Virginia.—The State Department of Conservation and Development and other State and Federal agencies cooperated in operating 91 gaging stations. Studies of ground water were continued, chiefly on the Coastal Plain. A report on the ground-water resources of northern Virginia was prepared for publication, and a preliminary report on Sussex, Southampton, and Isle of Wight Counties was released. The program of observation wells near Washington, D. C., was continued. Analyses were made of 17 samples collected in connection with studies of ground water.

Virgin Islands.—A study was made of the ground-water conditions on the Island of St. Croix, and reports were made to the Division of Territories and Island Possessions on a program of test drilling on that island.

Washington.—The State Department of Conservation and Development and other State, county, municipal, and Federal agencies cooperated in operating 105 gaging stations. Ground-water studies were continued, and a report was released on the ground-water resources of the Tacoma area. Records were obtained on public water supplies and on water levels in observation wells in a State-wide program, with special attention to the Spokane area and the Pullman area of the Soil Conservation Service. During the year 2,250 samples from 3 streams in Pullman were examined for silt content in connection with the operation of the Pullman demonstration project of the Soil Conservation Service, and analyses were made of 13 samples of ground water collected near Tacoma.

West Virginia.—The State Public Service Commission and other State and Federal agencies cooperated in surface-water investigations and in the operation of 63 gaging stations.

Wisconsin.—The State Public Service Commission and other State and Federal agencies cooperated in surface-water investigations and in the operation of 89 gaging stations. Records of water levels in observation wells were obtained through informal cooperation with the Soil Conservation Service and the State Conservation Department. During the year 1,920 samples from 2 streams near LaCrosse were examined for silt content in connection with the operation of the LaCrosse demonstration project of the Soil Conservation Service.

Wyoming.—Surface-water investigations were continued in cooperation with the State Engineer, and 114 gaging stations were operated. Funds were also contributed by permittees of the Federal Power Commission and by the Kansas City Army Engineer office.

CONSERVATION BRANCH

The work of the Conservation Branch involves surveys and investigations for an inventory of the water and mineral resources of the public domain, supervision of private development of power and production of minerals from public and Indian lands and naval petroleum reserves, and supplying information and advice to numerous land-administrative agencies of the Government.

Although these activities were maintained throughout the year, inadequate funds precluded the comprehensive and detailed consideration that the work warranted. The amount of field supervision required, which has been increasing each year, again advanced materially. On public land alone 133 operating properties were added to the number under supervision. Mineral production during the year from public and Indian lands and naval petroleum reserves under supervision had an estimated value of \$83,000,000, and the revenue accrued therefrom amounted to about \$9,500,000. Cost of supervision is small compared with the substantial revenue that it assures.

Cases pending in the Branch at the end of the year decreased 79 percent, largely through completion of the classification of 7,952 oil and gas prospecting permits under the act of August 26, 1937, as required by Departmental Order No. 1240 of December 23, 1937. Work on unit plans was maintained on a current basis throughout the year, and at its close all of the 1,665 plans of development and operation received had been given original technical consideration.

In addition to their regular activities members of the Branch were engaged on related Public Works projects, thus accomplishing useful conservation work.

MINERAL CLASSIFICATION DIVISION

The office activities of the Mineral Classification Division were directed largely to determining the areas subject to inclusion in plans for unit or cooperative development submitted by holders of Government oil and gas prospecting permits and leases, to consideration of oil and gas leases to be exchanged for outstanding oil and gas permits, to preparation of reports on initial applications for oil and gas leases, and to classifying lands embraced in applications for surface rights under the nonmineral public-land laws.

For mineral classification, information on the occurrence of coal in Montana, New Mexico, Utah, Washington, and Wyoming; of oil and gas in Alabama, Arizona, Arkansas, California, Colorado, Florida, Louisiana, Montana, New Mexico, Oklahoma, and Wyoming;

and of phosphate in Florida was obtained either by the personnel of the Mineral Classification Division or through the Geologic Branch.

In the work of the Division, 9,222 cases requiring technical consideration were disposed of during the year. In addition, a revision of the definitions of the known geologic structure of 14 producing oil and gas fields and the initial definition of 10 new fields were prepared and promulgated as follows:

Definitions of Known Geologic Structure, Fiscal Year 1939

State	Field	Date promulgated	Field area (acres)
Colorado	Wilson Creek	Dec. 9, 1938	12,886
New Mexico	Artesia ¹	Oct. 29, 1938	22,093
Do	Baish ¹	do	4,800
Do	Black River	do	640
Do	Compton ¹	do	2,000
Do	Cooper-Lynn ¹	Nov. 17, 1938	29,378
Do	Eunice	do	32,406
Do	Grayburg ¹	Oct. 29, 1938	3,342
Do	Hobbs ¹	Nov. 17, 1938	12,809
Do	Jackson ¹	Oct. 29, 1938	9,408
Do	Jal ¹	Nov. 17, 1938	17,139
Do	Leonard-Levers ¹	Oct. 29, 1938	5,120
Do	Mattix	Nov. 17, 1938	9,710
Do	Monument	do	32,404
Do	Pecos Valley ¹	Oct. 29, 1938	3,591
Do	Penrose-Hardy	Nov. 17, 1938	32,961
Do	Red Lake	Oct. 29, 1938	3,520
Do	Skaggs	Nov. 17, 1938	5,083
Do	Skelly ¹	Oct. 29, 1938	4,804
Do	Skelly-Sims	Nov. 17, 1938	6,849
Do	Stuart-Langlie	do	36,408
Do	South Eunice ¹	do	15,727
Do	Wills	Oct. 29, 1938	1,600
Utah	Clay Basin ¹	Sept. 15, 1938	6,728

¹ Revised.

The aggregate area of the outstanding definitions of the known geologic structure of oil and gas fields on June 30, 1939, amounted to 1,353,796 acres in California, Colorado, Montana, New Mexico, North Dakota, Oklahoma, Utah, and Wyoming.

WATER AND POWER DIVISION

The work of obtaining basic information on the water-power resources and storage possibilities of public land and of making it available for use in the administration of public-land laws and to Federal and other agencies engaged in planning, constructing, and operating water-power projects was continued in the field but on an increased scale through funds made available by the Public Works Administration. River utilization surveys covering 740 miles of streams and tributaries and detailed surveys at 12 dam sites were made. Surveys of mineral leaseholds embracing an area of 35 square miles were completed. The preparation was continued of reports on geologic conditions at dam sites examined in the field

during the preceding year. Field examinations of geologic conditions at 15 dam sites, geophysical examinations at 23 dam sites, and an experimental geophysical examination of one potash leasehold were made.

Office activities included action resulting in the addition of 19,924 acres to outstanding water-power reserves in 11 public-land States and Alaska and the elimination of 4,480 acres from such reserves in 7 States, with a net increase in the total reserved area in 22 States and Alaska to 6,690,576 acres. The addition of 3,199 acres to reservoir-site reserves made a total of 134,648 acres withdrawn. Field supervision, with the Water Resources Branch, of power projects for the Federal Power Commission involved supervision of construction and operation on 160 projects, continuation of studies of cost accounting on 9 of these projects, and investigations and reports on 5 of the projects. Field supervision of power projects holding permits and grants from the Department of the Interior involved 172 projects.

MINING AND OIL- AND GAS-LEASING DIVISIONS

The work of the Mining and Oil- and Gas-leasing Divisions consists of inspectional and regulatory supervision of mineral prospecting and development on public and Indian lands and naval petroleum reserves.

The Mining Division is charged with supervision of all operations for the discovery and development on public land of deposits of coal, potassium, sodium, phosphate, and oil shale; in New Mexico and Louisiana of sulfur; on certain land grants of gold, silver, and mercury; and on restricted, allotted, and tribal Indian lands of all minerals except oil and gas. This supervisory and regulatory work during the fiscal year was accomplished through six field offices at Denver, Colo., Billings, Mont., Carlsbad, N. Mex., McAlester and Miami, Okla., and Salt Lake City, Utah, and through a cooperative agreement approved May 4, 1935, with the Department of Mines, Territory of Alaska. During the year the territorial delineation of two mining districts was changed and a new mining district created, with headquarters at Carlsbad, N. Mex.

The work of the Oil- and Gas-leasing Division includes inspectional and regulatory supervision of all operations for the discovery, development, and production of petroleum and natural gas on public land of the United States, on naval petroleum reserves, and on all Indian land subject to departmental jurisdiction, both tribal and allotted, except the Osage Reservation, Okla. The work was accomplished during the year through 16 field offices and suboffices at Los

Angeles and Taft, Calif., Roswell and Farmington, N. Mex., Tulsa, Oklahoma City, Ardmore, Holdenville, and Drumwright, Okla., Denver, Colo., Casper, Midwest, and Thermopolis, Wyo., Billings and Great Falls, Mont., and Salt Lake City, Utah. During the year the supervisory headquarters in California was moved from Taft to Los Angeles, and the Casper subdistrict, comprising the southern part of Wyoming, was divided into two subdistricts.

Public land.—The number of public-land properties under supervision of the Mining Division at the end of the year was 683, a decrease of 60 since June 30, 1938. Coal properties in 14 States and Alaska decreased 51, to 575; potash properties in 2 States decreased 6, to 28; sodium properties in 8 States decreased 3, to 46; phosphate properties in 3 States were again 7; sulfur properties in 1 State were again 27. The relatively large decrease in coal properties resulted indirectly from the Secretary's instructions of January 24, 1934, and that in potash properties from the Secretary's Order No. 914 of April 5, 1935. The Secretary's Order No. 1294 of July 2, 1938, restricted further issuance of phosphate leases and permits. In prospecting for the above-named minerals 40 boreholes were drilled during the year.

Accidents to employees working in mines under departmental lease are generally fewer than in competitive mines not on Government land, and it is gratifying to note that of the 67 awards to coal and potash mines made by the Joseph A. Holmes Safety Association for the calendar year 1938, 7 were made to departmental lessees. The use of safety appliances and safety clothing is increasing generally throughout mines on Government land.

The number of public-land properties under supervision of the Oil and Gas Leasing Division decreased about 0.5 percent to a total of 8,560, involving 11,466,872 acres in 19 States and Alaska. Drilling activity on public land during the fiscal year included the commencement of 325 new wells and the completion of 301 wells, of which 224 were rated as productive of oil and gas and 77 as barren. The total number of wells under supervision on June 30, 1939, was 8,823, including 4,503 capable of oil or gas production. Production of petroleum from public land in the fiscal year 1939 was about 7 percent less than in the preceding year; production of gas increased about 6 percent; and production of natural gasoline decreased about 5 percent.

The personnel of the Division continued to assist in the preparation of unit or cooperative plans of operation and development and in reviewing and revising the engineering and royalty features of such plans after their submission. Approximately 250 outstanding

oil and gas prospecting permits were classified under the various extension provisions of the act of August 26, 1937 (50 Stat. 842). At the end of the year a total of 1,665 plans of unit or cooperative development for oil or gas pools, fields, or areas involving public land had been filed with the Geological Survey, of which 111 had been given final approval by the Secretary of the Interior, 1,527 had been rejected, withdrawn, or suspended, and 27 were pending final action. During the year 28 unit agreements were filed, 55 acted upon, and 20 approved by the Secretary of the Interior.

Indian land.—The number of Indian-land properties under supervision of the Mining Division during the year was 246 in 11 States. These properties involved 45 lead and zinc leaseholds in the Quapaw Reservation, Okla., with aggregate royalty accruals of \$526,118.47, an increase of 7.96 percent over that of the preceding year; 56 coal leaseholds on segregated Choctaw and Chickasaw land and restricted allotted land in Oklahoma, with an aggregate production that decreased from 289,089.10 tons in 1938 to 268,503.78 tons in 1939, and revenue accruals from royalties, bonuses, and sale of coal lands amounting to \$49,307.57; 4 unleased purchased tracts and 1 asphalt lease on segregated land in Oklahoma; and 140 properties in 10 western States, of which 14 were agency coal mines, 14 coal leases, 63 individual Indian coal mines, and 49 metalliferous leases and nonmetalliferous leases other than coal leases.

Oil and gas supervision involved 4,984 leaseholds, 4,039 wells, and aggregate bonus, royalty, and rental accruals estimated at \$2,000,000 for Indian beneficiaries in 10 States and 33 different tribes. The cooperative duties involved royalty accounting; appraisals of bonuses, royalty offers, and pollution damages; assistance to lessees of Indian land on operating problems and in the preparation of unit plans of development; and assistance to agency officials and tribal councils on technical phases of leasehold development and administration.

Naval petroleum reserves.—On behalf of the Navy Department supervision was continued during the year over operations for the production of oil and gas within Naval Petroleum Reserves Nos. 1 and 2, in California, and for the conservation of shut-in production within Naval Petroleum Reserve No. 3, in Wyoming. Production from 514 wells on the reserves aggregated 3,874,995 barrels of petroleum, 2,260,305,000 cubic feet of natural gas, and 10,067,618 gallons of natural gasoline and had an aggregate royalty value of \$947,268.19.

PUBLIC WORKS PROJECTS

Under the supervision of personnel of the Conservation Branch, expenditures aggregating \$159,521.59 were made during the year

from Public Works funds allotted for field investigations and conservation work. On 10 projects \$66,188.67 was expended for river-utilization surveys of power and storage resources of important streams in 10 States. On 11 projects \$93,332.92 was expended in 8 States to plug and abandon or condition for use as a source of water numerous wells that had been drilled for oil and gas on public land and had theretofore been improperly abandoned or merely deserted; to fill, bulkhead, or otherwise safeguard abandoned mines or openings on Indian land; and for construction and repairs at 2 federally owned camps.

SUMMARY OF FIELD ACTIVITIES, BY STATES

Alabama.—Investigated oil- and gas-prospecting operations throughout the State and examined two tracts in Fayette County for mineral classification. Supervised one coal lease on public land.

Alaska.—Supervised 1 power project, 2 leases, 12 prospecting permits, 4 licenses for coal, and 146 prospecting permits for oil and gas on public land.

Arizona.—Examined 1 tract in Maricopa County for mineral classification and 19 dam sites for geologic conditions, 13 of these by geophysical methods. Supervised 23 power projects, 2 prospecting permits for coal and 3 for sodium, and 8 leases and 59 prospecting permits for oil and gas on public land, 7 Indian agency coal mines, and 6 asbestos leases, 1 gold lease, and 1 guano lease on Indian land. Surveyed 40 linear miles of river basin and 2 dam sites under Public Works allotments.

Arkansas.—Investigated oil- and gas-prospecting operations in the north-eastern, central, and southwestern parts of the State for mineral classification. Supervised 1 power project and 9 prospecting permits for oil and gas on public land.

California.—Investigated oil and gas development in the southern part of the State for mineral classification. Supervised 93 power projects, 2 prospecting permits for coal and 32 for sodium, 1 sodium lease, 1 potash lease, and 406 leases and 885 prospecting permits for oil and gas on public land, 1 coal lease, 2 gold leases, and 1 copper-lead lease on Indian land, and 22 oil and gas leases on naval petroleum reserves. Conditioned 1 oil and gas well for abandonment, salvaged equipment from naval petroleum reserves, and renovated 1 federally owned camp under Public Works allotments.

Colorado.—Completed structural and stratigraphic investigations of the Black Canyon structure, Mesa County; of the Piceance Creek and Wilson Creek structure, Rio Blanco County; and of the Powder Wash structure, Moffat County, for mineral classification. Examined 10 dam sites by geophysical methods. Supervised 12 power projects, 91 leases, 19 prospecting permits, 7 licenses for coal, 1 sodium lease, and 90 leases and 577 prospecting permits for oil and gas on public land, and 2 coal leases and 1 vermiculite lease on Indian land. Surveyed 10 square miles of mineral leaseholds, 100 linear miles of river basin, and 2 dam sites, and conditioned 5 oil and gas wells for abandonment under Public Works allotments.

Florida.—Investigated phosphate and oil and gas prospecting operations throughout the State, and examined 1 tract in Alachua County, 1 tract in High-

lands County, 1 tract in Manatee County, 1 tract in Polk County, and 3 tracts in Taylor County, for mineral classification.

Idaho.—Supervised 38 power projects, 2 leases and 15 prospecting permits for coal, 1 phosphate lease, and 1 lease and 68 prospecting permits for oil and gas on public land, and 1 limestone lease on Indian land. Surveyed 70 linear miles of river basin and 4 dam sites under Public Works allotments.

Kansas.—Supervised 26 leases and 3 prospecting permits for oil and gas on public land and 5 leases for oil and gas on Indian land.

Louisiana.—Investigated oil and gas prospecting operations throughout the State for mineral classification. Supervised 52 leases for oil and gas on public land.

Michigan.—Supervised 1 lease for oil and gas on public land and 7 leases for oil and gas on Indian land.

Mississippi.—Supervised 1 power project.

Montana.—Continued an areal stratigraphic and subsurface structural investigation in Glacier, Toole, Liberty, and Pondera Counties, and completed a reconnaissance geologic survey of the Cascade-Augusta region in Cascade and Lewis and Clark Counties, for mineral classification. In cooperation with the Geologic Branch completed an investigation of the coal resources of the Otter Creek district in Big Horn, Powder River, and Rosebud Counties. Supervised 43 power projects, 93 leases, 17 prospecting permits, and 45 licenses for coal, 5 phosphate leases, and 199 leases and 673 prospecting permits for oil and gas on public land, and 3 agency coal mines, 7 coal leases, 4 silver-lead-gold leases, 1 bentonite lease, and 51 leases for oil and gas on Indian land. Examined 2 applications for complex-metal leases and 1 group of complex-metal mining claims on Indian land. Surveyed 150 linear miles of river basin and 2 dam sites, conditioned 4 oil and gas wells on Indian land for abandonment, and repaired and conditioned 2 water wells on public land under Public Works allotments.

Nebraska.—Supervised 2 leases for oil and gas on public land.

Nevada.—Supervised 28 power projects, 5 coal prospecting permits, 8 sodium permits, and 2 leases and 63 prospecting permits for oil and gas on public land and 11 marl leases on Indian land. Examined 6 dam sites for geologic conditions and surveyed 60 linear miles of river basin under Public Works allotments.

New Mexico.—Examined 1 tract in Colfax County and continued an areal, stratigraphic, and subsurface structural investigation in Lea and Eddy Counties, for mineral classification. Completed a stratigraphic and structural investigation of the Bueyeros carbon-dioxide area in Harding County. Supervised 3 power projects, 23 leases, and 18 prospecting permits for coal, 17 permits for sodium, 15 leases and 26 permits for potash, 27 permits for sulphur, and 677 leases and 1,354 prospecting permits for oil and gas on public land, and 4 agency coal mines, 2 coal leases, 63 individual Indian coal mines, and 5 leases for oil and gas on Indian land. Examined 1 potash leasehold by geophysical methods, conditioned 2 oil and gas wells for abandonment, and surveyed 1 square mile of mineral leasehold and 80 linear miles of river basin under Public Works allotments.

New York.—Supervised 2 leases for oil and gas on Indian land.

North Dakota.—Supervised 60 leases and 19 licenses for coal, 3 prospecting permits for sodium, and 5 leases and 23 prospecting permits for oil and gas on public land.

Oklahoma.—Investigated oil and gas prospecting operations in the southern part of the State for mineral classification. Supervised 3 power projects, 68

leases, and 38 prospecting permits for oil and gas on public land; 29 leases, 25 mining permit leases, 1 leased purchased tract, and 4 unleased purchased tracts for coal, 1 asphalt lease, and 1 right-of-way lease on segregated tribal and restricted allotted Indian lands; 45 zinc-lead leases on Quapaw Indian land; and 4,832 leases for oil and gas on Indian land. Conditioned 1 oil and gas well for abandonment, and filled, bulkheaded, or otherwise safeguarded 475 abandoned mines or openings on Indian land under Public Works allotments.

Oregon.—Examined 2 dam sites for geologic conditions. Supervised 36 power projects, 2 coal prospecting permits, and 1 lease and 68 prospecting permits for oil and gas on public land.

South Dakota.—Supervised 5 leases, 3 prospecting permits, and 1 license for coal, and 18 leases and 29 prospecting permits for oil and gas on public land and 6 leases for oil and gas on Indian land.

Utah.—Began a topographic survey and a geologic and structural investigation of the coal resources in the vicinity of Sunnyside, in Carbon County. Supervised 15 power projects, 61 leases, 32 prospecting permits, and 2 licenses for coal, 3 sodium permits, 1 phosphate lease, and 53 leases and 852 prospecting permits for oil and gas on public land and 6 gilsonite leases on Indian land. Surveyed 4 square miles of mineral leasehold and 50 linear miles of river basin, conditioned 2 oil and gas wells for abandonment on public land, and filled 6 surface openings on Indian land under Public Works allotments.

Washington.—Investigated geologic conditions in the Glacier coal field, in Whatcom County, and economic conditions affecting the Big Four coal lease, in King County. Examined 1 dam site for geologic conditions. Supervised 23 power projects, 1 lease and 10 prospecting permits for coal, and 8 prospecting permits for oil and gas on public land and 5 silver-lead-gold leases, 6 tungsten leases, and 31 leases for oil and gas on Indian land. Surveyed 2 dam sites and 80 linear miles of river basin under Public Works allotments.

Wisconsin.—Supervised 2 power projects.

Wyoming.—Continued a topographic, structural, and stratigraphic investigation of the Lance Creek oil field, in Niobrara County, and of an area in the eastern part of Niobrara County. Completed a structural investigation of the western part of the Dewey area, in Weston and Niobrara Counties, for mineral classification. Investigated the coal resources of an area in the Hanna Basin, in Carbon County. Supervised 10 power projects, 62 leases, 47 prospecting permits, and 22 licenses for coal, 1 lease and 1 permit for sodium, and 805 leases and 1,291 prospecting permits for oil and gas on public land and 2 coal leases and 43 leases for oil and gas on Indian land. Tested shut-in pressures on Naval Petroleum Reserve No. 3 for the purpose of conserving shut-in production. Performed technical supervision at Emergency Conservation Camp 858, established for conserving coal deposits. Surveyed 19 square miles of mineral leasehold and 110 linear miles of river basin, conditioned for abandonment 3 oil and gas wells on public land and 29 oil and gas wells on Indian land, repaired 2 water wells on public land and 2 water wells on Indian land, and renovated 1 federally owned camp under Public Works allotments.

WORK ON PUBLICATIONS

Texts.—The book publications of the year numbered 63 in the regular series and 21 pamphlets and circulars for administrative use. The total number of pages was 12,713. Besides these printed publi-

cations 55 brief papers were issued in mimeographed form as memoranda for the press or as informative circulars. During the year 18,932 pages of manuscript were edited and prepared for printing, 1,070 galley proofs were read, and 7,761 page proofs were revised. Indexes were prepared for 31 publications, covering 3,264 pages. Copy and proof or stencils for 473 pages of multigraph and mimeograph matter were read.

Illustrations.—The illustrations prepared consisted of 1,121 drawings and photographs. Six hundred and forty-six illustrations to accompany 30 reports were transmitted to the printer, and 463 proofs and 46 edition prints were examined.

Geologic map editing and drafting.—The preliminary geologic map of Leadville, Colo., and vicinity was drawn, engraved, and printed. Color proof of the geologic map of the Front Range, Colo., was read and the map prepared for printing. A total of 170 drawings, chiefly geologic maps, sections, and diagrams, were made and edited, to illustrate scientific papers prepared by geologists of the Survey to be published as State Geological Survey reports or in other scientific journals. The drawings for 17 papers were edited, and proofs of geologic maps and other illustrations for 8 reports were read.

Distribution.—A total of 642 publications, comprising 63 new books and pamphlets, 124 new or revised topographic and other maps, 33 Tennessee Valley Authority maps with contours, 226 reprinted topographic and other maps, and 144 new advance sheets and 52 reprinted advance sheets were received during the year. A number of special pamphlets and forms for administrative use were also delivered and distributed. The total units of all publications received numbered 139,892 books and pamphlets and 1,151,049 topographic and other maps, a grand total of 1,290,941. There were distributed 110,233 books and pamphlets, 3,731 geologic folios, and 803,368 maps, a grand total of 917,332, of which 3,596 folios and 678,374 maps were sold. The net proceeds (gross collections less copying fees and amounts refunded) from the sales of publications were \$38,137.22, which included \$37,615.89 for topographic and geologic maps, and \$521.33 for geologic folios. In addition to this amount, \$11,495.46 was repaid to the Survey by other establishments of the Federal Government at whose request maps or folios were furnished. The total net receipts, therefore, were \$49,632.68.

Engraving and printing.—During the year 86 newly engraved topographic maps, including 4 revised maps, were printed, and also 38 special maps. Of the newly engraved maps, 58 were completed under Public Works allotment. Corrections were engraved on the

plates of 350 maps. Reprint editions of 213 engraved topographic maps and 13 photolithographed State and other maps were printed and delivered. In addition, 39 new topographic maps had been engraved and were in press June 30, including 20 under Public Works allotment, and the engraving of 123 other new topographic maps was in hand, including 47 under Public Works allotment. Of new and reprinted maps, 350 different editions, amounting to 1,003,609 copies, were delivered.

A large amount of work was done for 71 other units of the Federal Government and State governments, and the charge for it was about \$174,000, for which the appropriation for engraving and printing geologic and topographic maps was reimbursed.

Transfer impressions numbering 543 were made during the year, and the amount turned over to miscellaneous receipts was \$420.83.

Of topographic maps and contract and miscellaneous work of all kinds, a grand total of 3,152,546 copies was printed and delivered.

The photographic laboratory made 10,709 negatives (including 3,567 wet plates for photolithographs, 889 wet plates for photographic prints, 43 paper negatives, 242 dry plates, 623 lantern slides, 207 half-tone negatives, and 5,138 field negatives), 23,393 prints (including 11,008 maps and diagrams, 35 celluloid positives, 11,661 photographs for illustrations and records, and 689 bromide enlargements), 3,033 zinc plates, 285 intaglio etchings, and 29 celluloid prints and mounted 1,753 prints.

LIBRARY

The total number of books and separate items circulated by the library amounted to 40,000. Books borrowed from other libraries for the use of the Geological Survey numbered 727, and books loaned to other libraries numbered 2,347. More than 2,100 new books, periodicals, maps, and other items were received, and more than 9,000 new cards were filed in the catalog. About 1,275 books were bound at the Government Printing Office.

The consolidated volume of the bibliography of North American geology for 1929-38 is 46 percent complete.

APPROPRIATIONS AND EXPENDITURES

The appropriation made directly for the work of the Geological Survey for the fiscal year 1939 included 10 items, amounting to \$3,164,680, of which \$50,608.38 remained unobligated on June 30, 1939. In addition, \$7,000 was allotted from the appropriation for contingent expenses of the Department of the Interior for miscellaneous supplies.

Financial Statement of the Geological Survey for the Fiscal Year 1939

	Funds available			Obligations			Balance
	Amounts appropriated or transferred	Repayments and adjustments		Total	Disbursements	Outstanding liabilities	Total
		Made	To be made				
Salaries.....	\$144,680.00	\$228.05		\$144,908.05	\$144,907.24	\$253,374.56	\$144,907.24
Topographic surveys.....	725,000.00	436,647.67		1,244,515.61	986,036.74	1,229,411.30	15,104.31
Geologic surveys.....	500,000.00	49,383.77	10,087.45	559,471.22	541,692.47	555,619.49	3,851.73
Alaskan mineral resources.....	60,000.00	8.50		60,008.50	50,981.83	8,594.36	59,576.19
Gaging streams.....	1,050,000.00	493,405.06	278,453.62	1,821,858.68	1,725,840.49	1,796,220.36	25,638.32
Classification of lands.....	105,000.00	4,459.82	346.96	109,806.78	108,371.98	783.11	651.69
Printing and binding.....	120,000.00			120,000.00	18,055.50	99,444.50	2,500.00
Preparation of illustrations.....	25,000.00	484.02		25,484.02	25,389.30	40.50	54.22
Geologic and topographic maps.....	120,000.00	121,021.43	54,633.20	295,654.63	280,930.76	13,213.53	1,510.34
Mineral leasing.....	315,000.00	8,338.31	376.73	323,733.04	318,936.66	3,933.73	864.65
Total.....	3,164,680.00	1,113,996.63	426,765.90	4,705,442.53	4,181,142.97	473,691.18	50,608.38
Central Valley reclamation project, California (reimbursable) (transfer to Geological Survey), 1939.....	19,235.00			19,235.00	15,673.99	1,058.49	2,502.52
Construction, etc., irrigation systems Indian reservations (reimbursable) (transfer to Geological Survey), 1938-39.....	1,250.00			1,250.00	802.99	385.88	61.13
Federal Power Commission (transfer to Interior, Geological Survey), 1939.....	350.00			350.00	350.00		
Flood control, general (transfer from Agriculture to Interior, Geological Survey).....	52,300.00			52,300.00	28,075.03	3,881.65	31,956.68
Flood control, general (transfer to Interior, Geological Survey).....	248,937.95	15.56		48,953.51	32,963.48	3,830.78	36,894.25
Flood control, Mississippi River and tributaries (transfer to Interior, Geological Survey).....	34,106.49			4,106.49	3,393.87	704.28	4,098.15
Irrigation, Indian reservations (reimbursable) (transfer to Geological Survey), 1939.....	15,000.00	54.65		15,054.65	10,217.36	4,726.71	110.58
Maintenance and improvement of existing river and harbor works (transfer to Interior, Geological Survey).....	232,380.68	226.52		232,607.20	136,346.36	36,532.96	59,727.88
Maintenance and improvement of existing river and harbor works (transfer to Interior, Geological Survey, act of Aug. 9, 1937).....	1,941.11			1,941.11	1,941.11		
Maintenance and improvement of existing river and harbor works (transfer to Interior, Geological Survey, act of June 22, 1936).....	63.79			63.79	63.79		
Maintenance, Wapato irrigation and drainage system, etc., Yakima Reservation, Wash. (receipt limitation) (transfer to Geological Survey), 1939.....	500.00			500.00	153.53	346.47	500.00
Operation and conservation of Naval Petroleum reserves (transfer to Interior, Geological Survey), 1939.....	38,000.00	1,182.57		39,182.57	39,099.82		82.75
Public Works Administration, act of 1938 (allotment to Interior, Geological Survey), 1938-40.....	2,665,000.00	5,949.83	32.33	2,670,982.16	1,936,974.48	35,052.86	608,954.82

Public Works Administration, allotment to Interior, Geological Survey, 1935-41.....	\$ 105,479.09	3,788.93	-----	109,208.02	83,566.26	2,011.93	85,578.19	23,089.83
Special and technical investigations, International Joint Commission United States and Great Britain (transfer to Interior), 1939.....	47,800.00	2.63	-----	47,802.63	45,354.52	2,290.61	47,645.13	157.50
Supervising mining operations on leased Indian lands (reimbursable) (transfer to Interior, Geological Survey), 1939.....	95,000.00	956.27	-----	95,956.27	95,592.68	360.00	95,952.68	3.59
Tennessee Valley Authority fund (transfer to Interior, Geological Survey), 1939.....	107,500.00	913.18	225.00	108,638.18	97,753.82	8,119.24	105,873.06	2,755.12
Working fund, Interior, Geological Survey (Agriculture, highway funds, act of June 16, 1933, National Industrial Recovery)	\$ 23,394.10	-----	-----	23,394.10	9,573.30	-----	9,573.30	13,820.80
Working fund, Interior, Geological Survey (cooperative construction of rural post roads)	\$ 19,133.89	2,876.02	286.66	22,296.57	20,330.25	906.65	21,236.90	1,059.67
Working fund, Interior, Geological Survey (General Land Office, maps) 1938-39.....	8,000.00	-----	-----	8,000.00	4,964.31	3,035.69	8,000.00	-----
Working fund, Department of the Interior (transfer from Army engineers to Geological Survey for topographic mapping, fiscal year 1935).....	\$ 5,935.69	14.00	-----	5,949.69	1,670.79	-----	1,670.79	4,278.90
Transfer total.....	3,491,307.79	15,980.16	543.99	3,587,831.94	2,564,861.74	103,344.20	2,668,205.94	839,626.00
Grand total.....	6,655,987.79	1,129,976.79	427,309.89	8,213,274.47	6,746,004.71	577,035.38	7,323,040.09	890,234.38

¹ In addition to these appropriations there was an allotment of \$7,000 for miscellaneous supplies from the appropriation for contingent expenses of the Interior Department.

² Includes \$2,267.95 unobligated on June 30, 1938, and continued available for expenditure during the fiscal year 1939.

³ Includes \$106.49 unobligated on June 30, 1938, and continued available for expenditure during the fiscal year 1939.

⁴ Includes \$7,915.68 unobligated on June 30, 1938, and continued available for expenditure during the fiscal year 1939.

⁵ Balance unobligated on June 30, 1938, and continued available for expenditure during the fiscal year 1939.

**Classification of Obligations Incurred by the United States Geological Survey During
the Fiscal Year Ended June 30, 1939**

	Salaries	Topo- graphic surveys	Geologic surveys	Alaskan mineral resources	Gaging streams
Salaries of permanent employees.....	\$144,907.24	\$803,793.20	\$450,803.87	\$35,408.61	\$1,101,409.57
Wages of temporary employees.....		601,146.00	55,317.10	9,711.56	522,136.99
Supplies and materials.....		25,225.90	9,418.64	2,680.87	37,130.28
Dead storage of passenger-carrying vehicles.....					
Other storage and pasturage of animals.....		542.38	277.46		521.15
Communication services.....		1,594.80	437.14	22.10	7,197.90
Travel expenses.....		168,480.91	37,743.35	6,842.43	159,421.39
Hire, maintenance, repair, and operation of passenger-carrying vehicles.....		1,567.16	3,239.63	18.45	30,913.03
Transportation of things.....		14,827.10	3,729.06	1,981.33	16,528.86
Hire, maintenance, repair, and operation of freight-carrying vehicles.....		70,789.75	10,358.11		61,812.31
Printing and binding.....		109,634.34	9,484.09	1,242.39	6,753.30
Furnishing of heat, light, power, water, and electricity.....		4.00			467.38
Rents.....		11.80			3,856.03
Repairs and alterations.....		9,794.94	4,656.35	138.76	66,157.15
Special and miscellaneous current expenses.....		22.56	35.92		74.58
Purchase of passenger-carrying vehicles.....		1,745.93	1,066.91		20,108.94
Purchase of freight-carrying vehicles.....		121,342.37	17,028.18		48,070.00
Purchase of scientific instruments and parts.....		198,388.80	6,716.94	65.95	177,161.03
Other equipment.....		19,123.06	10,569.71	1,455.24	46,307.65
Structures and parts.....					241,133.69
Miscellaneous refunds, adjustments, and transfers.....		305,742.30	26,435.15	8.50	298,540.20
Total.....	144,907.24	2,453,777.24	647,317.61	59,576.19	2,845,701.43

	Classifica- tion of lands	Printing and bind- ing	Prepara- tion of illustra- tions	Geologic and topo- graphic maps	Mineral leasing	Total
Salaries of permanent employees.....	\$92,462.88		\$24,664.04	\$237,528.02	\$392,263.50	\$3,283,240.93
Wages of temporary employees.....	56,536.78			77.77	30,454.16	1,275,380.36
Supplies and materials.....	1,347.03		366.69	35,617.31	4,137.18	115,923.90
Dead storage of passenger-carrying vehicles.....						
Other storage and pasturage of animals.....					3.50	1,344.49
Communication services.....	373.18			5.52	3,111.12	12,741.76
Travel expenses.....	11,747.02		2.75	857.21	17,961.10	403,056.16
Hire, maintenance, repair, and op- eration of passenger-carrying ve- hicles.....	1,903.86				13,661.17	51,303.30
Transportation of things.....	421.65			275.62	3,772.67	41,536.29
Hire, maintenance, repair, and operation of freight-carrying vehicles.....	2,190.64				582.24	145,733.05
Printing and binding.....	978.29	\$117,500.00	249.59	8,886.35	688.04	255,416.39
Furnishing of heat, light, power, water, and electricity.....	19.70				4,711.89	5,202.97
Rents.....					562.50	4,430.33
Repairs and alterations.....	647.82		32.09	13,853.59	56,652.70	151,933.40
Special and miscellaneous current expenses.....					335.63	468.63
Purchase of passenger-carrying vehicles.....	1,372.79				5,265.94	29,560.51
Purchase of freight-carrying ve- hicles.....	650.27				543.63	187,634.45
Purchase of scientific instruments and parts.....	345.44		30.08	245.89	124.41	383,078.54
Other equipment.....	614.24		84.56	4,797.01	6,083.22	89,034.69
Structures and parts.....	4,149.83					245,283.52
Miscellaneous refunds, adjust- ments, and transfers.....	21.66				9,988.61	640,736.42
Total.....	175,783.08	117,500.00	25,429.80	302,144.29	550,903.21	7,323,040.09

In addition to the above amounts, there was expended directly by cooperating agencies \$53,954.44 for topographic surveys and \$505,393.25 for stream gaging.

APPENDIX

Summary of Outstanding Mineral Withdrawals, and Classifications

[June 30, 1939, in acres]

State	Coal		Oil		Oil shale		Phosphate		Potash
	With- drawn	Classified as coal land	With- drawn	Classi- fied as oil land	With- drawn	Classi- fied as oil-shale land	With- drawn	Classi- fied as phos- phate land	With- drawn
Alaska		56,993							
Arizona	139,415								
Arkansas		61,160							
California	17,603	8,720	1,178,392						90,324
Colorado	4,142,223	3,082,272	215,370		1,172,778	952,239			
Florida							66,796	120	
Idaho	11,520	4,603					276,239	270,936	
Louisiana			466,990	4,233					
Montana	6,044,408	9,373,884	1,336,697	67,651			280,089	3,833	
Nevada	83,673								39,422
New Mexico	4,119,616	1,074,723							9,282,160
North Dakota	5,954,364	11,178,286	84,894						
Oregon	4,361	18,887							
South Dakota		250,093							
Utah	3,404,043	1,267,697	1,035,034		2,737,274	2,703,755	277,344	2,937	
Washington	691,801	141,444							
Wyoming	2,143,991	3,684,735	541,777		2,079,897	425,214	989,133	25,293	
Total	26,757,028	33,365,997	4,859,154	71,884	5,989,949	4,081,208	1,889,601	302,219	9,411,906

¹ Includes 3,151 acres of coal land reserved for use of the United States (coal reserve No. 1).² Includes 13,578 acres withdrawn as helium reserve.³ Includes 2,078 acres of coal land reserved for use of the United States (coal reserve No. 2).

General Summary of Cases Involving Land Classification

Class of cases	Record for fiscal year 1938-39						Record since receipt of first case	
	Pending prior to July 1, 1938	Re- ceived during fiscal year	Total	Acted on during fiscal year	Pending June 30, 1939	Gain or loss during fiscal year	Re- ceived	Acted on
Mineral leasing laws:								
Permit applications	10	185	195	174	21	-11	62,700	62,679
Lease applications	833	3,455	4,288	4,261	27	+806	10,546	10,519
Committee cases		1	1	1			13,222	13,222
Concurrence	32	2,557	2,589	2,537	52	-20		
Interference (surface rights)	3	214	217	212	5	-2		
Unit operation plans	54	28	82	55	27	+27	1,665	1,638
Cases involved in unit plans	409	249	658	526	132	+277	5,641	5,509
Development (drilling operations, etc.)	4	48	52	47	5	-1	17,680	17,675
Miscellaneous	222	33	255	255		+222	7,952	7,952
Mineral classification: Oil and gas (including "349")	60	1,198	1,258	1,221	37	+23	32,155	32,118
Water and power:								
Federal Power Commission:								
Preliminary permits	6	55	61	59	2	+4	570	568
Licenses							28	
Determinations under sec. 24	8	61	69	54	15	-7	752	737
Classification	1	3	4	1	3	-2	565	562
Rights-of-way	15	81	96	84	12	+3	7,535	7,523
Irrigation project reports	1		1		1		945	944
General information:								
General Land Office (co-ops., etc.)	13	145	158	151	7	+6		
Indian Office							9,549	9,549
Total	1,671	8,313	9,984	9,638	346	+1,325		

Mineral Production From Public Land and Revenues Accrued Therefrom, Fiscal Year 1939

State	Petro- leum (barrels)	Natural gas (M cubic feet)	Gasoline (gallons)	Coal (short tons)	Potas- sium salts (short tons)	Sodium salts (short tons)	Phos- phate rock (long tons)	Accrued revenues
Alabama.....				18,445				\$1,844.48
Alaska.....				150,073				7,140.87
Arizona.....								557.00
California.....	15,671,430	41,418,716	3,960,182			69,923		2,831,606.69
Colorado.....	885,373	1,460,934	55,868	579,083		360		142,095.93
Idaho.....				1,479				573.17
Louisiana.....	289,035	1,239,785	9,718					67,556.32
Montana.....	484,497	2,521,542	16,600	525,059			26,017	131,581.86
Nebraska.....								140.00
Nevada.....				2		305		155.48
New Mexico.....	8,416,341	20,952,400	8,394,276	55,466	477,920	7,065		878,177.73
North Dakota.....		94,229		531,329				34,083.86
Oklahoma.....	128,547		144,015					16,291.37
South Dakota.....				3,021				1,262.40
Utah.....	392	3,598,499	418,877	968,721				136,088.38
Washington.....				31,880				3,187.33
Wyoming.....	12,035,654	13,709,756	24,228,526	1,239,768				1,716,228.85
Total.....	37,911,269	84,995,861	37,228,062	4,104,326	477,920	77,653	26,017	5,968,571.72
Total, 1938.....	41,630,368	79,932,430	39,509,893	3,794,641	572,307	69,305	20,291	7,228,492.12

Topographic mapping by the Geological Survey in the United States, Puerto Rico, and Hawaii, to June 30, 1939—Continued

State	Total area mapped during fiscal year 1939 (square miles)							Types of standard surveys, with contours, fiscal year 1939 (square miles)			Total area mapped to June 30, 1939 (square miles)	Percent- age of total area of State mapped to June 30, 1939	Control, fiscal year 1939				
	For publication on standard scales, with contour intervals from 2 to 100 feet; mapped on field scale of 1 to—							New survey	Re- survey	Revi- sion			Spirit levels (miles)	Transit traverse (miles)	Triangu- lation stations occupied		
	Planimetric on scale of 1 to— 1	10,000 or less	12,000	15,840	20,000	24,000	31,680									48,000	96,000
48,000	24,000					131		188		86	233		41,040	100.0			
								76		76			4 41,185	58.8	251	67	
						38		841		299	38	542	33,636	34.8	135	42	30
						113				113			40,884	90.6	88	113	
								222		222			1,248	100.0	92		
						5		344		344	5		15,500	50.0			
				3 16									20,231	26.1	129	197	5
		31,884				62		1,632		506	1,900		23,633	56.2			
								190		354	1,188		90,934	34.2	461	158	
							164			72			19,676	23.2	201	22	21
								84					8,936	93.4	93		
										12			37,983	89.1	296	192	4
				52				632		86	734		42,510	61.4	144		25
								334		318	50	18		100.0			
													24,170	35.7	57	193	
								200		200			20,017	35.7	187		
								200		698	37		34,942	35.7			
								200	555								
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									
								200									

¹ Compiled from aerial photographs with field examination. Show culture, drainage, and woodland, but no contours.² Mapped on scale of 1:2,400.³ Mapped from aerial photographs by stereophotogrammetric methods.⁴ Previous figures given overstated 1,073 square miles and here corrected.⁵ Contour interval 5 meters.

BOARD OF GEOGRAPHICAL NAMES

George C. Martin, *Executive Secretary*

THE UNITED STATES BOARD ON GEOGRAPHICAL NAMES is the organization through which the Federal Government provides for uniform usage in the form, spelling, and application of those geographic names that are used on maps and charts and in publications issued by the Government.

The Board is continuing work begun in 1890, when an informal interdepartmental committee was organized for the purpose of bringing about uniformity in geographic names used in the publications of the bureaus represented. That committee was given legal status in 1890, when President Harrison designated its members as a Board on Geographic Names and defined its authority. The name of the organization was changed in 1906 to the United States Geographic Board. It operated under that name until 1934, at which time it was transferred to the Department of the Interior.

The present Board is essentially a cooperative organization. In it the Department of the Interior furnishes administrative and investigative facilities through which representatives of the various Government departments that make and use maps, and certain geographic societies, determine policy in the use of geographic names and render decisions on such names as are submitted for decision.

The Board consists of an advisory committee, in which various governmental departments and geographic societies are represented, which acts chiefly through its executive committee, and of an administrative and investigative unit, called the Division of Geographic Names, in the office of the Secretary of the Interior. The personnel of the advisory and executive committees, on June 30, 1939, was as follows:

ADVISORY COMMITTEE

(Personnel, June 30, 1939)

Lt. Comdr. K. T. Adams, Assistant Chief, Division of Charts, Coast and Geodetic Survey, Department of Commerce.

Mr. Roscoe E. Baber, foreign-language editor and translator, member Style Board, Government Printing Office.

Mr. Clarence Batschelet, geographer, Bureau of the Census, Department of Commerce.

Mr. Albert H. Bumstead, chief cartographer, National Geographic Society.

Mr. E. E. Carter, Forest Service, United States Department of Agriculture.

Mr. William J. Dixon, Superintendent, Division of Postmasters, Post Office Department.

Dr. William H. Haas, professor of geology and geography, Northwestern University, representing the Geographic Society of Chicago.

Commander W. G. B. Hatch, officer in charge, Division of Maritime Security, Hydrographic Office, Navy Department.

Mr. W. L. G. Joerg, Chief, Division of Maps and Charts, The National Archives.

Lt. Col. Lawrence Martin, Chief, Division of Maps, and Incumbent, Chair of Geography, Library of Congress.

Dr. W. C. Mendenhall, Director, Geological Survey, United States Department of the Interior.

Mr. Raye R. Platt, secretary, American Geographical Society of New York.

Mrs. Sophia A. Saucerman, assistant geographer, Department of State.

Dr. John R. Swanton, Bureau of American Ethnology, Smithsonian Institution.

Dr. Frank E. Williams, professor of geography, Wharton School of Finance and Commerce, University of Pennsylvania, representing the Geographical Society of Philadelphia.

EXECUTIVE COMMITTEE

Dr. W. C. Mendenhall, *Chairman*

Mr. E. E. Carter

Mr. W. L. G. Joerg

The advisory committee held 2 meetings during the year, and the executive committee held 20 meetings at which 398 names were approved. Decisions on those names are printed in a pamphlet entitled "Decisions of the United States Board on Geographical Names, rendered between July 1, 1938, and June 30, 1939," which can be obtained without charge from the Superintendent of Documents, Government Printing Office, Washington, D. C. The locations of the features thus named, and the sources of the requests for decisions, are as follows:

Geographic Distribution of Names

Alaska	113	Tennessee	6	Kansas	2
Texas	62	Washington	5	Nevada	2
Louisiana	42	Arizona	4	West Virginia	2
Florida	24	Georgia	4	Wyoming	2
California	20	New Jersey	4	Idaho	1
Foreign	13	Virginia	4	Kentucky	1
Missouri	12	Connecticut	3	Maryland	1
New York	11	Massachusetts	3	New Hampshire	1
Wisconsin	10	North Carolina	3	Ohio	1
Maine	9	South Carolina	3	Utah	1
New Mexico	8	Vermont	3		
Oregon	7	Arkansas	2	Total	398
Pennsylvania	7	Iowa	2		

Sources of Requests for Decisions

U. S. Coast and Geodetic Survey--	175	Individuals-----	3
U. S. Geological Survey-----	102	Bureau of Reclamation-----	2
National Park Service-----	53	U. S. Biological Survey-----	2
U. S. Forest Service-----	23	State Department-----	1
State Organizations-----	12		
Soil Conservation Service-----	8	Total-----	398
U. S. Hydrographic Office-----	6		
U. S. Board on Geographical			
Names -----	6		

BUREAU OF RECLAMATION

John C. Page, *Commissioner*

EVIDENCE of the worth and need of Federal Reclamation works in the growing West continued to pile up during the fiscal year. Once again, despite steady and swift progress being made by the Bureau of Reclamation in the largest construction program of its 37-year history, the demand for the benefits of the Bureau's self-liquidating irrigation works outran the capacity to supply them.

New lands opened for farm settlement on the Owyhee reclamation project in Oregon and Idaho were quickly taken up during the year. On the last area opened for homestead entry four times as many applications were received as there were farm units offered, and inquiries from other eager farm home seekers continued to accumulate.

Still insufficient to meet heavy demands was water storage, even though at a peak; no sooner were storage and diversion dams completed than they were called upon to fill real need. A typical instance was the Bartlett Dam in Arizona, which within 120 days of its completion in May 1939, helped to offset a partial water shortage and promised to save valuable crops on the Salt River reclamation project.

In power, too, an important byproduct of reclamation, demand exceeded the ability to supply. Installation of a seventh great generator at Boulder Dam, making its power plant the largest operating in the world, met a critical need in the system of the Southern California Edison Co. The company reported the greatest peak load in its history on the very day the new generator went into steady operation.

Repayment Legislation

Repayment problems, arising from lack of flexibility in construction repayment contracts, received the thoughtful attention of the Bureau of Reclamation, western irrigation leaders, and the Congress, with the result that the Reclamation Project Act of 1939 was enacted. This law, perhaps the most important in this field since the original Reclamation Act of June 17, 1902, will make it possible to adjust many difficulties of the water users, to draft new contracts gearing repay-



CONSERVATION THROUGH IRRIGATION.

Upper: First test operation of the All-American Canal headworks at Imperial Dam, California and Arizona.

Lower: Acres of lettuce get water from an irrigation project in the Southwest.



ments to the ability year by year of the farmers to make payments, to reclassify lands from time to time, and to accomplish other needed reforms.

The new legislation should obviate the necessity in the future of extending blanket moratoria, even under severely depressed conditions, on repayments.

Of particular interest also is that section of the act which authorizes the construction, on sound business principles, of multiple-purpose projects involving irrigation. Through this section a fine conservation doctrine has been established. Conscientiously followed it will mean that conservation of the West's limited water resources on broad, related fronts will be achieved through coordinated use without waste and with maximum economy in construction. It will result, also, in a wider spread of public benefits from these useful works.

The Congress also heeded the Bureau's pleas for a more comprehensive investigation program, and appropriated \$900,000 for studies of water resources and proposed developments. This will enable employment of sounder practices in the approach to the future development of western streams. It will be possible to study river basins instead of sections of streams and should result in better planning.

New Homes Sought

The demand for new farms on Federal reclamation projects continued at the high level established several years ago as a result of continued drought in the Great Plains area. Settlement was completed on new areas of the Owyhee project, Oregon, for example, at the time water was available. About 35 percent of new settlers placed during the year were from the Dust Bowl.

In order to increase the service of new irrigated areas in the general program for rehabilitation of drought victims and other migrant farm folk, the Bureau sponsored with the Farm Security Administration a bill, enactment of which now makes it possible through cooperation for the Farm Security Administration to assist in financing needy but otherwise qualified homeseekers on Federal reclamation projects. This is a noteworthy advance in the approach to a problem of increasing gravity in the West. At the close of the fiscal year preparations were being made to undertake the first test of the new cooperative method of settlement on the Sun River project in Montana.

Arizona Power Shortage

Near the end of the fiscal year a serious situation was developing in central Arizona, where continued drought and low run-offs in several streams were creating a critical power shortage. A plan was worked

out by which power could be supplied, temporarily through an inter-connection at Parker Dam with a line from Boulder Dam, and on a more permanent basis directly from the plant at Parker Dam when that plant shall have been completed. An appropriation was made and construction of the transmission line from Parker Dam to Phoenix was begun. Preparation also was made at the close of the year to start work on the Parker Dam power plant. In the autumn of 1939 it was expected that power would be delivered to the Salt River Valley Water Users Association and to a utility serving central Arizona over the new line on terms which would repay the cost of new construction within 20 years.

Migratory Fish Control

A major program for control of migratory fish in the Columbia River was launched this year in connection with the Grand Coulee Dam project. The height of the dam makes it impossible for salmon and steelhead trout to return for spawning to areas above the dam. Fish returning upstream to spawn, therefore, are trapped at Rock Island Dam, below and near Grand Coulee Dam, and are transported in specially designed tank trucks to spawning grounds in tributaries entering the river below Grand Coulee Dam. While the 1939 runs were being handled in this manner, a series of hatcheries were being constructed to take care of future runs. The United States Bureau of Fisheries will operate this control program for 6 years at the expense of the project. By that time it is anticipated that the migratory fish will be reestablished, probably with the result that runs will be increased.

Stored Water

A fivefold increase within 6 years in water stored by Reclamation dams was recorded this year when the total amount so conserved exceeded 35,000,000 acre-feet. This increase reflects the addition of 24 new reservoirs, including Lake Mead, created by Boulder Dam, the largest in the world.

Boulder Power

During the year the Bureau of Reclamation paid into the United States Treasury \$5,400,000 received from the Boulder Dam and power plant. Part of this sum, however, had been collected during the previous fiscal year. The gross income during the year, including power receipts and payments on power machinery by the lessees, totaled \$4,321,000.

On June 1, 1939, the city of Los Angeles began paying at the firm power rate, under the terms of its contract, for virtually all the

energy it received from the project. For that month, the last of the fiscal year, the city alone paid \$157,105.

Safety Programs

In conformity with policies established by the President, safety programs on all construction projects of the Bureau were strengthened. While the changing nature of the work in progress makes comparisons difficult, it was felt that good results were being obtained. During the coming year this program will be further strengthened and vigorously prosecuted.

CONSTRUCTION PROGRAM

The Bureau of Reclamation continued its major construction program during the fiscal year. Work was in progress on 30 projects in 12 States.

One major dam was undertaken, bringing to 10 the number of storage dams under construction, and also one diversion dam. The following dams were completed during the year: Island Park on the Upper Snake River project in Idaho, Caballo on the Rio Grande project in New Mexico, Bartlett on the Salt River project in Arizona, Moon Lake on the Moon Lake project in Utah, Bull Lake on the Riverton project in Wyoming, Parker on the Parker Dam project in Arizona-California, Imperial on the Boulder Canyon project (All-American Canal System) in Arizona-California, and the Fruit Growers on the Fruit Growers Dam project in Colorado.

Work done during the year brought to a grand total of 156 the number of storage and diversion dams which have been completed by the Bureau since its origin in 1902. Of these, Shoshone, Arrowrock, Owyhee, and Boulder were each, at the time of completion, the highest in the world. Shasta, now under construction on the Central Valley project in California, will be 560 feet in height and rank next to Boulder, and Grand Coulee Dam, under construction on the Columbia Basin project in Washington, follows closely with a maximum height of 553 feet above foundation.

The Bureau's construction program was continued at an accelerated rate with appropriations from the Reclamation fund, the general funds of the Treasury, and carry-over Public Works Administration allotments and allocations under the Emergency Relief appropriation acts.

In November 1938 work was started on the Green Mountain Dam and power plant on the Colorado-Big Thompson project in Colorado, the dam site being located on the Blue River about 16 miles south of

Kremmling. The dam will be an earth and rock-fill structure, with a maximum height of 270 feet above the bed of the river, a crest length of 1,300 feet and volume of 4,366,000 cubic yards. It will be the highest and also the largest dam of its type ever constructed by the Bureau. The reservoir will have a capacity of 152,000 acre-feet and its purpose is to protect the water users in the Colorado River Basin against any depletion of their water supply by diversions through the Continental Divide Tunnel to the South Platte River Basin. The power plant will be equipped with two main generating units of 12,000-kilovolt-ampere capacity, with 14,100-horsepower turbines.

During the 1939 year the Bureau constructed 356.2 miles of canals, 138.8 miles of drains, 32 tunnels with a total length of 31,783 feet, 753.6 miles of roads, 12.8 miles of railroad, 357.8 miles of transmission lines, 71.7 miles of pipe lines, 11,307 canal structures, 290 bridges, 992 culverts, and 96 flumes. There were placed in dams 3,622,208 cubic yards of concrete, 5,257,400 cubic yards of earth, and 1,484,976 cubic yards of rock; and 40,260,162 cubic yards of earth and rock were excavated. The Bureau used 3,842,175 barrels of cement.

During the fiscal year 6,527 contracts were made, including 94 for labor and construction work amounting to \$51,746,564.28; 791 for equipment involving \$14,889,015.32; 1,565 for materials costing \$5,635,191.71; and 1,562 for supplies amounting to \$664,193.67, in addition to contracts for rental and sale of water, and various miscellaneous services.

Grand Coulee Dam

The second major contract at Grand Coulee for completion of the dam, left power house, and foundation for pumping plant, awarded late in the previous fiscal year was in progress and was 38 percent completed at the end of the year. Contract earnings were \$13,431,687 on a contract value of \$35,399,340. There were placed in the dam and appurtenant works 2,198,225 cubic yards of concrete, 18,399,783 pounds of reinforcing steel, 9,887,566 pounds of outlet-conduit gates and linings, and 9,600,000 pounds of bulkhead gates, penstocks, trash racks, pipe, tubing, and miscellaneous metalwork.

The ultimate installation in the Grand Coulee power plant will comprise eighteen 108,000 kilovolt-ampere main generating units, of which three were ordered in August, the contract price being \$2,627,900. Contracts were also placed for turbines and governors to cost \$1,552,259.

Excellent progress was made on the economic investigations and soil surveys of the 1,200,000 acres of irrigable lands. At the end

of the year retracement surveys were 80 per cent complete, topography 65 per cent, classification 50 percent, and appraisal about 30 per cent. Clearing of the Columbia River reservoir site was started with three 375-man permanent camps, one 80-man tent camp, and one 75-man floating camp in operation by the Work Projects Administration.

On the work in connection with migratory fish control, fish traps were installed at the Rock Island Dam on the Columbia River and the fish were transported to tributaries in specially-designed tank trucks for propagation. Work has started on the Leavenworth fish hatchery and 2,166 feet of the Snow Lakes tunnel was driven. A temporary warehouse was completed at the Leavenworth station.

Grand Coulee Dam, with a maximum height of 553 feet, will be the third highest concrete dam in the world, and its 10,200,000 cubic yards of concrete makes it the largest concrete structure.

Central Valley Project

On July 6, 1938, a contract was awarded to the Pacific Constructors, Inc., on their bid of \$35,939,450, for constructing the Shasta Dam and power plant on the Sacramento River, about 9 miles north of Redding. The dam is of the massive concrete gravity type with a central spillway section. It will have a maximum height of 560 feet, ranking next to Boulder among the Reclamation dams. It will be 3,500 feet in over-all length and will contain 5,400,000 cubic yards of concrete. The power plant will have an ultimate installed capacity of 375,000 kilovolt-amperes, with five 75,000 kilovolt-ampere units, four of which were ordered in May 1939. Contract earnings to the end of the fiscal year were \$9,174,213, with 25.5 percent completion. The contractor excavated 1,350,000 cubic yards of earth and 1,400,000 cubic yards of rock at both abutments and in the spillway channel and diversion tunnel. On June 10, 1939, a contract was awarded to the Permanente Corporation for furnishing 5,800,000 barrels of low-heat portland cement, the contract price being \$6,902,000 f. o. b. mill.

The Shasta dam and reservoir of 4,493,000 acre-feet capacity in the Sacramento, Pit, and McCloud Rivers are the principal features of the project, which is designed to alleviate critical water shortage and problems in three important agricultural areas in California, through the conservation of waste flood waters of the State's major rivers. In size and importance the Central Valley project is without precedent among the remedial projects undertaken by the Bureau.

By means of Shasta Dam in the north and Friant Dam in the south, regulation of both the Sacramento and the San Joaquin Rivers

will provide adequate water to supplement the irrigation supply of a large area of highly improved orchard and farm lands in the southern San Joaquin Valley; reestablish navigation to Red Bluff on the Sacramento River; prevent salt water intrusion in the irrigation channels of the delta of the Sacramento-San Joaquin Rivers; provide supplemental water for irrigation, domestic and industrial uses in the Walnut Creek-Martinez area, south of Suisun Bay; and make possible the generation of 350,000 kilowatts of water power at Shasta Dam.

The 1,600-foot diversion tunnel to bypass temporarily the Southern Pacific Railroad around the Shasta dam site, and later to divert the flow of the Sacramento River, was practically completed at the end of the year. The substructure of the Sacramento River bridge, first crossing, was also completed and the superstructure was 60 percent complete. Contracts were awarded for earthwork, tunnels, and structures on 19.97 miles of relocation of the Southern Pacific Railroad around the Shasta reservoir site. This will require 30 miles of relocation and the construction of eight bridges. Other contracts were awarded for superstructures of bridges at the second, third, and fourth crossings of the Sacramento River, and also the Doney Creek bridge.

At Toyon, the Government camp, building operations were practically completed, but an additional contract was awarded for 18 duplex cottages.

On the Delta division a contract for earthwork and structures on the first 3.9 miles of the Contra Costa Canal was completed. Two additional contracts for 18.1 miles of canal work were awarded, and work was started on pumping plants Nos. 1, 2, 3, and 4.

On the Friant division the Friant camp was completed large enough for present requirements. All surveys and testings at the Friant dam site were completed. Specifications and plans were prepared in the Denver office covering construction of the dam, and the work was advertised for bids on June 26, 1939. The dam will be of the concrete gravity type, approximately 300 feet in height, 3,430 feet long, and containing 1,900,000 cubic yards of concrete. Surveys were in progress on the Friant-Kern and Madera Canals during the year and were completed for 72 miles and 13 miles respectively.

Boulder Canyon Project

Construction at Boulder Dam during the year consisted of the erection of machinery and the installation of electrical equipment. The dam, spillways, outlet works, and diversion works were complete except for some supplemental drilling and grouting along the dam abutments and foundation; construction of a building to house an

exhibit and rest rooms; construction of aprons below the tunnel outlets; and improvements of the river channel below the dam.

The power-plant building is complete with the exception of the construction of wheel pits, machinery foundations, switch houses, and barrier operations. Installation of generating units N-6 and A-7 was completed and the two units placed in operation during the year. Units N-1 to N-6 inclusive, A-7 and A-8 were in operation at the close of the year, making the installed capacity of the plant 860,000 horsepower. Boulder thereby becomes the largest power plant in the world, overtopping the Dnieperstroy plant in Russia with a capacity of 746,000 horsepower. The installation of unit A-6 was in progress, and contracts were awarded for units A-1 and A-2. Work was continued on switchyards for the City of Los Angeles and the Metropolitan Water District. On June 30 Lake Mead contained 24,362,000 acre-feet and extended 115 miles upstream.

Excellent progress was made on the All-American canal system and the 80-mile All-American Canal from the Imperial Dam to the West Main Canal in the Imperial Valley was practically complete except for some structure work. Power drop No. 4 was completed and drop No. 5 was 95.5 percent completed. Work was in progress on drop No. 1 and the Coachella Canal turn-out, the Alamo River crossing, New Briar Canal crossing, Central Main Canal check and turn-out and on miscellaneous structures on the New Briar Canal and the lower 30 miles of the All-American Canal. All of this work was nearing completion at the end of the year.

The first 43-mile section of the Coachella Canal, a 130-mile branch of the All-American Canal to the Coachella Valley, was 55 percent complete on June 30. The contract calls for the excavation of 9,030,000 cubic yards of earth. On June 1 bids were opened for the construction of earthwork and structures on additional 47 miles of the Coachella Canal, the low bid of \$2,279,212.31 being submitted by the Morrison-Knudsen Co., Inc., and M. H. Hasler. A contract will be awarded for this work in July 1939. Surveys were in progress on the Coachella Canal and topography was taken in the Coachella Valley and on the East Mesa.

The All-American Canal is by far the largest irrigation ditch in the United States. It is 80 miles long and has an initial capacity of 15,000 cubic feet of water per second. The maximum section has a width of 232 feet at the water surface and a bottom width of 162 feet, with a water depth of 21 feet. Power will be developed on the canal by the Imperial Irrigation District at four points. Earth excavation has amounted to approximately 65,000,000 cubic yards. The Coachella branch will have an initial capacity of 2,500 second-feet.

In July 1938 the Imperial Dam on the Colorado River, about 15 miles northwest of Yuma, Arizona, was completed. On the California side, diversion will be made into the All-American Canal and on the Arizona side into the Gravity Main Canal of the Gila project. The structure is of the slab-and-buttress type, with a total length of 3,430 feet, inclusive of non-overflow sections, headworks, gate structures, sluiceway, and overflow spillway. The maximum height of the dam is 45 feet and the normal water surface will be raised 27 feet. At the site of the diversion dam the Colorado River carries large quantities of suspended silt. To decrease the amount of silt entering the canals, desilting works have been constructed, which consist of four basins, three on the California and one on the Arizona side. The California basins are each approximately 500 feet by 800 feet in plan and 12.5 feet deep with an influent channel through the center, while the Arizona basins are 1,200 feet long and about 150 feet wide. Provision has been made for the addition of a fourth basin for the All-American Canal and two for the Gravity Main Canal. Silt deposited in the basins will be removed by means of motor-driven rotating scraper mechanisms, and sluiced into the river below the dam.

Colorado-Big Thompson Project

The Colorado-Big Thompson project will provide a supplemental water supply for 615,000 acres of land now under cultivation, situated east of the Rocky Mountains in Colorado, with water collected and stored on the western slope of the mountains in the headwaters of the Colorado River. Stored water will be transported through the Continental Divide in a tunnel to the headwaters of the Big Thompson River, a tributary of the South Platte River, where it will be restored for release as needed for irrigation. Lands to be irrigated are situated within the Northern Colorado Water Conservancy District in Larimer, Boulder, Weld, Morgan, Logan, Washington, and Sedgwick Counties.

Principal construction features are the Continental Divide tunnel, the Green Mountain dam and power plant on the Blue River; Granby Reservoir on the Colorado River; Willow Creek diversion canal; North Fork diversion dam forming Shadow Mountain Lake, an extension of Grand Lake; Carter Lake, Arkins, and Horsetooth reservoirs; and several canals, power plants, and pumping plants.

On November 15, 1938, a contract was awarded to the Warner Construction Co. on its bid of \$4,226,206.20 for the construction of the Green Mountain Dam and power plant on Blue River, 16 miles south of Kremmling. On June 30 the contract was 15.2 percent completed. An order for turbines and generators for the power plant was placed in November 1938.

On June 7 bids were opened for construction of the Continental Divide Tunnel, which will be 13.1 miles long and 9 feet 9 inches in inside diameter. A contract had not been awarded at the end of the year. Work was in progress on Government camps at Green Mountain, Shadow Mountain, and Estes Park headquarters. On June 30 the Green Mountain camp was nearly completed. Shadow Mountain and Estes Park were 9 and 50 percent complete, respectively. Other work under way with percentages of completion were as follows: Roads to east and west portals of Continental Divide Tunnel, 16 percent; transmission line from Loveland to east portal of tunnel, 75 percent; transmission line from Green Mountain Dam to Grand Lake, 82 percent.

The cost of the project will be divided between irrigation and power. The Northern Colorado Water Conservancy District has contracted to repay the portion of the cost chargeable to irrigation, but not to exceed \$25,000,000. The remainder, on the power features, will be repaid from the sales of electrical energy, of which it is possible to produce as much as 900,000,000 kilowatt-hours annually. The estimated cost of the project is \$44,000,000.

Other Construction

Other important dams under construction during the fiscal year were the following: Marshall Ford Dam, 270-foot, concrete, straight-gravity type, on the Colorado River project in Texas; Vallecito Dam, 150-foot, earth-fill type, on the Pine River project in Colorado; Grassy Lake Dam, 120-foot, earth-fill type, on the Upper Snake River storage project in Idaho; Boca Dam, 110-foot, earth-fill type, on the Truckee River storage project, Nevada-California; Seminole Dam, 296-foot, concrete arch, on the Kendrick project in Wyoming; Fresno Dam, 77-foot, earth-fill type, on the Milk River project in Montana; Deer Creek Dam, 240-foot, earth-and-rock-fill type, on the Provo River project in Utah; and the Roza diversion dam, a concrete gravity weir, 55 feet in height, on the Roza division of the Yakima project in Washington.

The Seminole Dam and power plant building on the Kendrick project were 99 percent complete on June 30. Installation of power-plant machinery and equipment was in progress. Construction work was under way on the Casper main canal, which was 98 percent complete to mile 62, while the First Unit lateral system was 17 percent complete. Transmission lines were under construction from Seminole to Rawlins, Wyoming, Laramie to Cheyenne, and from Cheyenne, Wyoming, to Gering, Nebraska, and Greeley, Colorado; also transformer and switching stations at Casper, Rawlins, Cheyenne, Gering, and Greeley.

The first development at Marshall Ford Dam on the Colorado River project in Texas, consisting of a concrete section 190 feet high and 2,302 feet long at the crest, and an earth embankment section 35 feet high and 1,100 feet long were practically complete at the end of the year. In addition, a base for the enlarged dam, to be 270 feet in height, was placed in the river blocks to elevation 520, except penstock blocks which were raised to elevation 670. About 20,000 cubic yards of concrete were also placed in enlargement blocks 1 to 5.

The Bartlett Dam, on the Verde River in Arizona, completed in May, has a maximum height of 287 feet and is the highest multiple-arch dam in the world. The Parker Dam on the Colorado River, Ariz.-Calif., was completed in September. It is 325 feet in height, of the concrete, variable radius arch type, and was built by the Bureau for the Metropolitan Water District of Southern California to divert water into the Colorado River-Los Angeles aqueduct. On June 21 a contract was awarded for construction of transmission lines from Parker Dam to Phoenix and Blaisdell, Ariz. There is an acute water shortage in the Salt River Valley and the 161,000-volt line to Phoenix, 136 miles in length, will transmit Boulder power to that area, connecting with the Central Arizona Light and Power Co. plant about 6 miles west of Phoenix. The estimated cost of the line is \$1,500,000, which will be paid for by the power users. The 120-mile line to Blaisdell, also 161,000 volts, will be constructed after the Phoenix line is completed, and will transmit power to a pumping station on the Gila project; its estimated cost is \$1,200,000.

On June 30 approximately 27 miles of the Yakima Ridge Canal, 99 miles in length, the main canal of the Roza division, Yakima project in Washington, was completed. This work included two 17-foot diameter tunnels, 18,000 feet in length; a 1,500-foot concrete siphon, 15 feet 4 inches in diameter, under the Yakima River; and 1.3 miles of bench flume, 28 feet wide. An additional stretch of 12.6 miles of main canal was 29 percent complete and Tunnel No. 5, a 4,000-foot structure, was practically completed. The Roza diversion dam, including railroad revision, was 86 percent completed.

Seventeen miles of the 28-mile Heart Mountain Canal on the Shoshone project were completed at the end of the year. Work was in progress on the Shoshone Canyon conduit, the Shoshone River siphon, and the Buck Springs Creek siphon.

Construction of the Deer Creek Dam on the Provo River project in Utah was started in July 1938 and was in progress during the year, the contract being awarded to the Rohl-Connolly Co. at its bid of \$2,189,096. In December a contract was awarded for construction of the Olmsted and Alpine-Draper tunnels, the first work to be undertaken on the Aqueduct division.

The first unit of the Gila project in Arizona, comprising 150,000 acres, was 20.5 percent complete on June 30. Work was in progress on the Gravity Main Canal, between stations 30 and 946+70, and on the Fortuna spillway.

On the Payette division of the Boise project in Idaho, the main canal, which includes nine tunnels and extensive bench flume and lined sections, was complete except for wasteways. Work was in progress on branch canals and laterals under four contracts.

A power-plant building at the Elephant Butte Dam on the Rio Grande project in New Mexico was started in October by Government forces. The power plant will have a capacity of 34,500 horsepower with three units. Orders for the turbines and generators were placed in November. The Boca Dam on the Truckee Storage project in Nevada-California was 98 percent completed at the end of the year. On the Upper Snake River project in Idaho the Island Park Dam was completed during the year and construction of the Grassy Lake Dam was 61 percent completed on June 30. Work was in progress on the Glendive unit of the Buffalo Rapids project in Montana with Emergency Relief funds during the year, the work consisting of canals, laterals, structures, and pumping plant. Minor construction work was under way on the Sun River project in Montana, Deschutes project in Oregon, Owyhee project in Oregon-Idaho, Carlsbad in New Mexico, and the Riverton project in Wyoming.

CUMULATIVE CONSTRUCTION RESULTS

In the 37 years the following construction has been completed by the Bureau of Reclamation: 156 storage and diversion dams; 48 powerhouses; 2,812 buildings; 20,101.4 miles of canals, ditches, and drains; 81.8 miles of tunnels; 4,661.6 miles of telephone lines; 285.4 miles of dikes; 6,337 flumes; 20,597 culverts; 13,738 bridges; 198,521 other irrigation structures.

Reservoirs of the Bureau of Reclamation now have a combined capacity of 47,121,170 acre-feet of water.

POWER

Twenty-three power plants were operated on 13 Federal reclamation projects during the 1939 fiscal year. Their total output was 2,212,568,189 kilowatt-hours of energy.

The sixth and seventh of the great generators at Boulder Dam were placed in service during the year, in August 1938 and June 1939. The eighth generator was practically ready for operation and was to be placed in service shortly after the close of the fiscal year. Generators for the ninth and tenth units were ordered in May. With one smaller unit, two station service units, and the seven large gen-

erators in operation, a total of 1,676,946,245 kilowatt-hours of electrical energy were generated at Boulder Dam. Of this amount 1,646,046,171 kilowatt-hours were sold for a gross revenue of \$2,388,995.90.

Gross sales of energy from all project plants totaled \$5,610,847.14. Some of the plants are operated and controlled by the water users' organizations.

Projects under construction which include power developments are the Grand Coulee Dam-Columbia Basin project in Washington, the Central Valley project in California, the Colorado-Big Thompson project in Colorado, the Elephant Butte power development of the Rio Grande project in New Mexico and Texas, and the Kendrick project in Wyoming. The power plant of the latter, located at Seminoe Dam, was nearly ready to commence operation at the end of the fiscal year.

RECLAMATION FUND

Except for payment into the reclamation fund of \$29,778,300.23 as provided in the Hayden-O'Mahoney amendment to the departmental appropriation bill last year, accretions to the fund remained at a low level as will be indicated by the table below:

Accretions to Reclamation Fund, by States

States	Sale of public lands		Proceeds from Oil Leasing Act		Total to June 30, 1939
	Fiscal year 1939	To June 30, 1939	Fiscal year 1939	To June 30, 1939	
Alabama.....			\$2,754.86	\$188,165.41	\$188,165.41
Arizona.....	\$19,937.03	\$2,725,264.44		160.20	2,725,424.64
California.....	25,484.90	8,230,535.23	1,505,555.06	17,328,502.14	25,559,037.37
Colorado.....	15,470.39	10,298,773.35	57,850.21	765,052.43	11,063,825.78
Idaho.....	10,699.05	7,029,622.43	171.27	20,947.79	7,050,570.22
Kansas.....	249.66	1,033,426.39	94.50	115.50	1,033,541.89
Louisiana.....			41,230.60	237,284.89	237,284.89
Mississippi.....				11.55	11.55
Montana.....	10,293.79	15,369,380.88	55,788.75	1,311,543.74	16,680,924.62
Nebraska.....	308.27	2,094,739.41	73.50	73.50	2,094,812.91
Nevada.....	7,282.48	1,033,529.16	.28	5,531.65	1,039,060.81
New Mexico.....	25,777.75	6,708,211.52	445,199.46	1,799,791.59	8,508,003.11
North Dakota.....	608.97	12,219,820.63	10,582.88	179,802.42	12,399,623.05
Oklahoma.....	187.99	5,929,732.57			5,929,732.57
Oregon.....	13,594.72	11,994,427.88		186.82	11,994,614.70
South Dakota.....	764.32	7,734,177.34	664.81	2,808.77	7,736,986.11
Utah.....	114,292.97	4,363,571.79	63,862.03	681,007.36	5,044,579.15
Washington.....	11,135.25	7,462,007.93		33,749.63	7,495,757.56
Wyoming.....	25,712.87	8,691,203.81	908,456.08	36,173,417.89	44,864,621.70
Total.....	281,800.41	112,918,424.76	3,092,284.29	58,728,153.28	171,646,578.04
Proceeds, Federal water power licenses.....					1 802,590.91
Proceeds, potassium royalties and rentals.....					2 500,755.58
Receipts from Naval Petroleum Reserves, 1920 to 1938, Act of May 9, 1938.....					29,778,300.23
Grand total.....					202,728,224.76

¹ Proceeds for fiscal year, \$22,323.94.

² Proceeds for fiscal year, \$89,800.32.

The effect of the provision that repayments of allotments made from emergency funds to reclamation projects be deposited in the reclamation fund has not as yet been felt, and it is not expected to be felt for several years, owing to the fact that the projects on which this money was expended, for the most part, are not completed.

As a consequence, it is anticipated that by the close of the 1941 fiscal year the reclamation fund will be so depleted that it will be unable to carry the construction of all the projects now being financed from the fund. Two means of correcting this situation, which soon may become critical, are suggested. Either the reclamation fund should be increased by an advance from the General Fund of the Treasury, or certain of the more costly of the projects now being constructed by appropriations from the fund should be financed by appropriations from the General Fund of the Treasury or in other ways.

Repayments

Construction payments during the year totaled \$2,165,934.97; operation and maintenance collections amounted to \$1,164,932.67; and water rental receipts made up \$363,377.89. Arrearages at the close of the fiscal year were: Construction, \$1,580,864.76; operation and maintenance, \$208,653.46; and water rental, \$150,444.99, amounts which represent slight increases over comparable figures for the previous year. Operation of the Reclamation Project Act of 1939 in future years should correct situations resulting in such delinquencies.

Status of Reclamation Fund

Accretions to the fund:

Sales of public lands.....	\$112, 918, 424. 76
Royalties and rental under Mineral Leasing Act.....	58, 728, 153. 28
Potassium royalties and rentals.....	500, 755. 58
Federal water-power licenses.....	802, 590. 91
Receipts from Naval Petroleum Reserves, 1920 to 1938, Act of May 9, 1939.....	29, 778, 300. 23
<hr/> Total accretions.....	<hr/> 202, 728, 224. 76
Collections—construction and operation and maintenance repay- ments, water rents, power, and light, etc.....	124, 620, 828. 20
<hr/> Total cash available.....	<hr/> 327, 349, 052. 96
Disbursements.....	305, 486, 685. 78
<hr/> Balance in fund June 30, 1939.....	<hr/> 21, 862, 367. 18

Accounts Receivable, Construction Water-Right Charges

State and project	Due		Collected			Uncollected June 30, 1939
	Fiscal year 1939	To June 30, 1939	Cash		Other credits to June 30, 1939	
			Fiscal year 1939	To June 30, 1939		
Arizona:						
Salt River	\$217,796.90	\$7,399,318.81	\$217,796.90	\$7,399,318.81		
Yuma Auxiliary	1 2,893.75	576,018.62	1 4,393.17	573,275.49	\$1,744.57	\$998.56
Arizona-California: Yuma	227,979.75	4,497,624.66	166,246.74	3,728,838.16	712,670.14	56,116.36
California: Orland	27,405.26	854,423.13	26,507.16	827,250.73		27,172.40
Colorado:						
Grand Valley	55,503.11	308,766.32	25,953.97	141,853.53	160,261.25	6,651.54
Uncompahgre	98,525.88	695,610.52	18,525.19	482,434.43	65,727.24	147,448.85
Idaho:						
Boise	304,245.56	4,616,702.63	312,325.30	4,612,286.76	27,193.29	7,222.58
Minidoka	367,503.21	8,913,852.48	217,082.48	7,746,642.98	931,208.13	236,001.37
Montana:						
Bitter Root	36,122.26	108,366.78	18,061.13	54,111.97		54,254.81
Huntley	17,691.68	606,782.61	16,376.61	508,752.11	97,225.40	805.10
Milk River	44,053.14	171,964.02	31,692.10	58,604.96		113,359.06
Sun River	33,521.42	345,552.32	24,226.83	292,665.85	44,931.87	7,954.60
Montana-North Dakota:						
Lower Yellowstone	72,482.77	465,233.37	64,631.56	428,244.22	1,722.75	35,266.40
Nebraska-Wyoming: North						
Platte	309,518.00	4,841,647.60	134,071.90	3,068,241.70	1,715,226.67	58,179.23
Nevada: Newlands	86,022.36	1,372,135.49	74,667.05	1,277,242.79	89,703.19	5,189.51
New Mexico: Carlsbad	14,966.48	918,083.85	17,996.38	909,641.80	81.25	8,360.80
New Mexico-Texas: Rio						
Grande	274,427.09	3,773,029.26	208,106.01	3,287,670.94	485,358.32	
Oregon:						
Baker	5,769.50	14,423.75	5,769.50	14,423.75		
Umatilla	15,482.98	649,870.72	3,435.44	412,086.35	5,607.95	232,176.42
Oregon-California: Klamath	89,245.98	1,355,211.70	83,746.01	1,307,577.20	7,245.12	40,389.38
South Dakota: Belle Fourche	57,716.09	755,837.20	19,157.00	589,676.79	82,913.03	83,247.38
Utah:						
Hyrum	23,250.00	23,250.00				23,250.00
Salt Lake Basin	88,192.90	304,663.49	88,192.90	304,663.49		
Strawberry Valley	82,155.06	1,554,556.91	81,405.06	1,541,418.69	13,138.22	
Washington:						
Okanogan	10,000.00	158,327.74		138,327.74		20,000.00
Yakima	352,695.28	7,744,632.39	289,584.00	7,241,669.20	86,668.41	416,264.78
Wyoming: Shoshone	46,832.56	1,100,414.26	44,720.92	933,346.06	166,512.57	555.63
Total	2,956,211.47	54,156,270.63	2,165,934.97	47,880,266.50	2 4,695,139.37	1,580,864.76
Paid in advance of due dates			1 35,912.37	361,688.46	3 227,706.98	
Refunds				100,225.10	3,212.84	
Total collections			2,130,022.60	48,342,180.06		
Contributed funds applying to construction cost not included in above table			79,563.73	1,946,358.83		

1 Contra.

2 Other credits for fiscal year, \$378,899.90.

3 Decrease for fiscal year, \$9,041.62.

Accounts Receivable, Operation and Maintenance Charges (After Public Notice)

State and project	Due		Collected			Uncollected June 30, 1939
	Fiscal year 1939	To June 30, 1939	Cash		Other credits to June 30, 1939	
			Fiscal year 1939	To June 30, 1939		
Arizona: Yuma Auxiliary.....	\$15,861.86	\$533,452.10	\$14,894.05	\$516,050.19	\$13,816.35	\$3,585.56
Arizona-California: Yuma.....	178,604.81	4,333,271.04	170,172.67	4,131,093.33	196,973.93	5,203.78
California: Orland.....	32,346.02	743,335.03	32,851.65	701,885.80	25,757.82	15,691.41
Colorado:						
Grand Valley.....	49,963.81	556,995.38	49,963.81	523,995.38	33,000.00	
Uncompahgre.....		1,008,683.69		977,809.79	30,873.90	

Accounts Receivable, Operation and Maintenance Charges (After Public Notice)— Continued

State and project	Due		Collected			Uncollected June 30, 1939
	Fiscal year 1939	To June 30, 1939	Cash		Other credits to June 30, 1939	
			Fiscal year 1939	To June 30, 1939		
Idaho:						
Boise	\$14,774.49	\$2,225,127.29	\$14,774.49	\$2,172,477.57	\$52,649.72	
King Hill		60,711.27		59,192.22	1,519.05	
Minidoka	47,265.31	2,320,886.25	34,036.04	2,160,510.92	141,715.43	\$18,659.90
Montana:						
Huntley		554,787.34		543,594.31	11,193.03	
Milk River	50,661.94	523,126.74	47,355.86	493,525.31	1,662.25	27,939.18
Sun River		168,718.50		164,366.28	4,352.22	
Montana-North Dakota:						
Lower Yellowstone		338,562.56		338,557.93	4.63	
Nebraska-Wyoming:						
North Platte	27,328.82	2,003,109.00	24,361.95	1,925,712.55	66,542.32	10,854.13
Nevada: Newlands		1,174,581.57		1,135,901.55	38,680.02	
New Mexico: Carlsbad	56,769.01	1,085,824.69	56,769.01	1,068,951.98	16,872.71	
New Mexico-Texas: Rio Grande	348,980.00	5,296,381.19	343,287.49	5,029,517.87	266,863.32	
North Dakota:						
Buford-Trenton		2,317.41		2,317.41		
Williston		34,042.75		34,042.75		
Oregon:						
Umatilla	3,427.49	398,775.69	2,783.35	390,877.59	7,253.96	644.14
Vale	24,058.83	84,415.39	24,058.83	84,415.39		
Oregon-California: Klamath	65,240.00	1,502,381.29	65,304.55	1,467,711.01	30,536.22	4,134.06
Oregon-Idaho: Owyhee	¹ 4,309.23	46,560.65	¹ 4,309.23	46,560.65		
South Dakota: Belle Fourche	61,870.43	1,385,787.28	61,870.43	1,376,411.29	9,375.99	
Utah: Strawberry Valley		376,880.88		365,022.21	11,858.67	
Washington:						
Okanogan		371,441.72		368,788.67	2,653.05	
Yakima	237,187.58	6,295,512.93	223,735.02	6,100,700.39	74,191.97	120,620.57
Wyoming: Shoshone	2,797.80	564,048.67	3,022.70	539,022.51	23,705.43	1,320.73
Total	1,212,828.97	33,989,718.30	1,164,932.67	32,719,012.85	² 1,062,051.99	208,653.46
Paid in advance of due dates			¹ 28,518.36	164,960.21	³ 14,870.71	
Penalties and interest			6,136.09	542,200.80	⁴ 20,499.89	
Refunds				38,241.47	156.00	
Total collections			1,142,550.40	33,464,415.33		

¹ Contra.² Other credits for fiscal year, \$18,467.35.³ Increase for fiscal year, \$3,887.89.⁴ Increase for fiscal year, \$19.89.

Accounts Receivable, Rentals of Irrigation Water

State and Project	Due		Collected			Uncollected June 30, 1939
	Fiscal year 1939	To June 30, 1939	Cash		Other credits to June 30, 1939	
			Fiscal year 1939	To June 30, 1939		
Arizona:						
Salt River		\$2,246,726.01		\$2,246,726.01		
Yuma Auxiliary	\$1,944.43	16,928.46	\$1,187.00	16,171.03		\$757.43
Arizona-California: Yuma	7,518.84	584,495.87	7,964.84	571,794.68	\$12,654.19	47.00
California: Orland	193.44	121,683.17	193.44	121,683.17		
Colorado:						
Grand Valley	10,912.60	555,536.06	10,912.60	549,035.39	6,500.67	
Uncompahgre	1,537.47	1,235,781.32	50.02	1,222,711.98		13,069.34

Accounts Receivable, Rentals of Irrigation Water—Continued

State and Project	Due		Collected			Uncollected June 30, 1939
	Fiscal year 1939	To June 30, 1939	Cash		Other credits to June 30, 1939	
			Fiscal year 1939	To June 30, 1939		
Idaho:						
Boise.....	\$8,050.00	\$830,188.57	\$8,050.00	\$825,468.07	\$4,720.50	-----
Boise-Payette.....	1,488.55	1,488.55	1,305.55	1,305.55	-----	\$183.00
Minidoka.....	57,935.42	913,619.00	56,279.62	908,510.99	3,383.01	1,725.00
Montana:						
Huntley.....	506.35	14,118.83	506.35	14,118.83	-----	-----
Milk River.....	109.82	239,072.70	509.96	229,126.06	1,208.14	8,738.50
Sun River.....	13.03	132,669.93	56.30	130,759.22	1,366.62	544.09
Montana-North Dakota: Lower Yellowstone.....	561.60	138,209.00	198.00	137,150.78	-----	1,058.22
Nebraska-Wyoming: North Platte.....	4,303.70	354,168.17	4,303.70	354,158.17	10.00	-----
Nevada: Newlands.....	-----	28,291.16	-----	22,114.31	6,176.85	-----
New Mexico:						
Carlsbad.....	551.31	41,292.59	551.31	41,292.59	-----	-----
Hondo.....	-----	9,129.70	-----	9,129.70	-----	-----
New Mexico-Texas: Rio Grande..	86,878.35	1,693,751.31	86,859.54	1,672,974.94	-----	20,776.37
North Dakota:						
Buford-Trenton.....	-----	31.75	-----	31.75	-----	-----
Williston.....	-----	2,117.28	-----	2,117.28	-----	-----
Oregon:						
Umatilla.....	1,974.00	104,703.77	1,974.00	78,426.97	-----	26,276.80
Vale.....	10.66	21,572.21	58.66	21,417.38	-----	154.83
Oregon-California: Klamath.....	55,663.57	562,878.41	54,615.76	557,046.35	25.00	5,807.06
Oregon-Idaho: Owyhee.....	92,527.50	230,213.92	68,799.88	196,714.27	-----	33,499.65
South Dakota: Belle Fourche.....	709.71	12,145.45	439.41	11,857.35	17.80	270.30
Utah: Strawberry Valley.....	-----	17,596.13	-----	17,596.13	-----	-----
Washington:						
Okanogan.....	-----	110,645.28	-----	108,061.09	2,584.19	-----
Yakima.....	596.53	225,703.02	2,493.90	184,476.17	4,082.69	37,144.16
Wyoming:						
Riverton.....	44,156.88	174,963.41	41,766.62	161,904.88	12,677.17	381.36
Shoshone.....	14,327.29	137,855.50	14,301.43	133,953.77	3,889.85	11.88
Total.....	392,471.05	10,757,576.53	363,377.89	10,547,834.86	159,296.68	150,444.99

¹ Other credits for fiscal year, \$2,310.74.

POPULATION OF THE PROJECTS

At the close of the fiscal year there was reported for the Federal reclamation projects a total population of 903,897 persons. Of this number 226,969 persons lived on 52,552 irrigated farms, and 676,928 resided in 258 towns and cities located on the projects or in the immediate vicinity and largely dependent on the irrigated areas for their prosperity. Notable increases over 1937 are found in all of these figures.

Within the areas thus developed as the result of the construction of the Federal irrigation systems there have been established 944 schools and 1,133 churches. There were 112 banks serving the settlers of the project farms and towns, with \$226,645,573 in deposits made by approximately 245,000 depositors.

Settlement and Economic Data, Fiscal Year 1939

State	Project	Irrigated farms		Towns		Number of schools	Number of churches	Bank deposits
		Number	Population	Number	Population			
Arizona	Salt River	19,000	68,000	12	95,000	91	152	\$59,256,800
Arizona-California	Yuma	1,606	3,127	5	8,700	13	27	1,603,460
California	Orland	668	2,024	1	1,200	9	10	1,030,108
Colorado	Grand Valley	526	1,625	6	19,950	17	38	4,709,960
	Uncompahgre	1,683	6,083	3	8,600	28	35	3,993,027
Idaho	Boise	4,025	15,900	16	48,980	128	118	(?)
	Minidoka	3,479	11,335	³ 6	³ 8,040	³ 22	³ 54	(?)
Montana	Bitter Root	331	1,257	6	4,500	10	13	1,741,464
	Frenchtown	30	141	3	17,150	15	23	8,764,093
	Huntley	628	1,846	5	702	8	6	180,292
	Milk River	719	2,716	17	11,694	32	36	3,882,654
	Sun River	798	2,298	5	943	9	10	257,687
Montana-North Dakota	Lower Yellowstone	673	3,657	7	4,050	18	22	1,007,600
Nebraska-Wyoming	North Platte	2,822	9,656	17	22,496	69	54	6,874,276
Nevada	Humboldt	63	200	1	1,350	4	4	895,506
	Newlands	698	3,160	4	2,200	16	12	840,136
	Truckee River Storage	400	1,700	2	29,000	24	17	17,429,089
New Mexico	Carlsbad	449	2,146	4	8,500	9	12	1,933,009
New Mexico-Texas	Rio Grande	5,460	25,820	36	133,829	88	128	35,134,591
Oregon	Umatilla	459	1,631	5	1,655	7	12	⁴ 415,591
	Vale	430	1,680	3	1,600	5	12	366,857
Oregon-California	Klamath	919	3,923	5	17,735	30	35	(?)
Oregon-Idaho	Owyhee	1,630	6,340	5	6,900	28	24	(?)
South Dakota	Belle Fourche	900	2,381	5	3,600	28	17	2,300,000
Utah	Hyrum	425	1,500	3	3,500	5	6	(?)
	Moon Lake	600	2,550	10	4,500	17	15	555,000
	Ogden River	1,230	4,900	4	54,000	25	56	26,903,000
	Sanpete	¹ 210	1,160	2	1,950	7	6	1,038,000
	Strawberry Valley	2,200	5,550	12	25,000	27	26	1,163,300
	Weber River	2,100	10,000	10	48,000	46	50	26,798,000
Washington	Okanogan	414	937	3	4,700	9	8	1,231,074
	Yakima	5,506	17,844	23	51,090	78	62	6,737,184
Wyoming	Kendrick	0	0	4	20,000	17	19	9,005,164
	Riverton	400	1,400	3	2,564	2	4	(?)
	Shoshone	1,071	2,582	5	3,250	3	10	599,152
Total, fiscal year 1939		52,552	226,969	258	676,928	944	1,133	226,645,573

¹ Estimated.² Not reported.³ Gooding division not included.⁴ West division not included.⁵ No banks on project or in project towns.

OPERATION AND MAINTENANCE

The care and operation of 16 completed projects or divisions of projects have remained under the direct supervision of the Bureau with annual charges fixed by public notices issued by the Secretary. The water users are required to advance sufficient funds to cover the annual cost of operation and maintenance with no water delivered until the charges have been paid. There are 25 projects or divisions of projects where the canal systems have been completed and turned over to organized water users for operation and maintenance under contracts. With few exceptions the care and operation of storage dams and reservoirs have been retained by the Bureau.

There are two major problems confronting the Bureau in the operation and maintenance of the projects. The first is to bring about more economical use of water in the irrigation of crops. Relatively

high charges per acre-foot where excessive quantities of water are used is a deterrent. More effective is an educational campaign demonstrating benefits that follow economical use of water, among which are the reduction of seepage, prevention of soil erosion, and leaching of valuable plant food. Crop production has been increased rather than diminished through reducing the amount of water applied in irrigation in many areas.

Educational work is carried on by the Operation and Maintenance Division in cooperation with water users' organizations, State colleges, county agricultural agents; through the use of lectures, illustrated by both motion pictures and slides; and by conducting field tours of project water users to selected farms. Printed information was prepared during the year concerning the practical use of soil and water for dissemination to farmers on the projects and to other interested persons. Many requests have been received for this material.

The second problem demanding attention is the reduction of canal losses in carrying water from the point of diversion to the land. The conditions vary widely on the different projects and will require intensive study to determine how excessive losses can best be reduced, whether the results that can be expected will justify the probable cost, and how the work can be financed. On several of the projects good results have been obtained on canals constructed in porous material by lining with concrete or blanketing with clay or other tight material.

The control of noxious weeds continued to be a serious matter on several projects, but through the cooperative efforts of State, county, and district officials, the Bureau has obtained encouraging results in many places. Weed surveys have been continued and maps prepared showing the location and extent of noxious weeds. On projects recently completed the water users were shown through illustrated lectures the several varieties of noxious weeds that may become a serious menace and were instructed in preventing their growth.

The Bureau has continued to act as a clearing house for the dissemination of information concerning improved methods of maintaining canal systems and improved types of machinery and farm implements used in cleaning canals and preparing land for irrigation.

One public land opening on the Succor Creek division of the Owyhee project, Oregon, made 29 farm units available for homestead entry. For these units there were 109 applications received and considered. Development of the farms was progressing at a satisfactory rate. Many demands for public-land farms continued to be received throughout the year, and preparations were being made to open to settlement in the immediate future 81 farm units on the Sun River project in Montana and 39 units on the Riverton project in Wyo-

ming. Of importance in connection with these two openings are arrangements that have been made, following interdepartmental negotiations and subsequent congressional authorization, for the cooperation of the Farm Security Administration in furnishing certain financial assistance to prospective settlers who are otherwise qualified under Bureau regulations to enter a reclamation farm unit. Constant efforts are being made to improve the procedure for selecting settlers.

On May 31, 1939, Congress passed an act (Public No. 97, 76th Cong.) granting the Secretary authority to extend relief to projects, by postponement, where warranted, of construction payments due for 1938, as well as other unpaid construction charges required to be paid before the delivery of water in 1939. Pursuant to this act a field investigation was made of the conditions on all the projects and reports were submitted to the Secretary with recommendations for relief in certain deserving cases. The construction payments for 1938, due under the provisions of repayment contracts, totaled approximately \$3,000,000. Extensions were granted on about 7 percent of this sum. In accordance with provisions contained in the New Reclamation Act of August 4, 1939, a similar procedure may be carried out for the benefit of projects unable to meet the 1939 construction installments.

CROP RESULTS

Prevailing low prices for farm commodities during the irrigation season of 1938 resulted in lowered crop values, although production was generally good. The total irrigable area in Federal and Warren Act projects was 3,766,212 acres, or an increase of 16,721 acres over 1937. The net area in cultivation increased from 3,034,761 acres in 1937 to 3,040,695 in 1938. Total values for all crops for the 1938 season amounted to \$113,463,460 which was a decrease of \$5,194,812, as compared with the previous year.

With decreased prices, the average crop value on 1,764,363 acres on the Federal reclamation projects was \$38.47 per acre. An additional 1,276,332 acres receiving water under Warren Act contracts had an average per acre crop value of \$35.73. Together, the crop value averaged \$37.31 per acre, as compared with \$39.09 for 1937.

The production of sugar beets on many of the projects has been found a profitable cash crop but expansion has been curtailed on practically all projects by the restrictions imposed by the Sugar Act, administered by the Department of Agriculture.

The only serious water shortage in 1939 was on the Belle Fourche project in South Dakota. On a few projects it was not possible to deliver a full supply but the shortage was not serious and did not reduce crop production.

Irrigation and Crop Results on Government Projects, 1938

State	Projects and divisions	Lands on projects covered by crop census					Other lands served by Government works, usually by a partial water supply through private canals under Warren Act or other water-service contracts. (See Reclamation table No. 23 for detailed break-down.)				
		Irrigable acreage 1	Irrigated acreage	Area in cultivation 2	Crop value		Irrigable acreage	Irrigated acreage	Area in cultivation 2	Crop value	
					Total	Per acre				Total	Per acre
Arizona	Salt River	242,925	225,420	229,425	\$18,460,319	\$80.46	90,943	55,363	55,363	\$2,953,952	\$53.36
	Yuma	71,360	52,558	54,000	2,115,251	39.17					
	Valley Division	52,378	43,864	44,763	1,642,574	36.70					
	Reservation Division	7,743	2,355	2,355	59,576	25.30					
	Bard Division	7,257	4,827	5,470	176,488	32.26					
California	Yuma Auxiliary (Mesa)	3,982	1,412	1,412	236,613	167.59					
	Orland	20,410	14,978	14,978	495,176	33.06					
	Grand Valley	30,513	18,343	18,393	666,654	36.24	18,427	15,500	15,500	1,634,800	105.44
	Uncompahgre	91,363	60,677	60,288	1,278,971	21.21	3,846	3,314	3,314	69,855	21.08
	Boise	166,030	150,152	150,337	3,662,294	24.36	126,955	118,790	112,690	2,489,839	22.09
	New York Irrigation District	16,344	14,822	14,960	232,703	15.55					
	Nampa-Meridian Irrigation District	36,944	34,454	34,454	798,770	23.18					
	Boise-Kuna Irrigation District	47,739	43,990	43,990	948,965	21.57					
	Wildier Irrigation District	56,486	49,044	49,091	1,458,084	29.70					
	Big Bend Irrigation District	1,713	1,417	1,417	26,820	18.89					
Idaho	Black Canyon Irrigation District (Notus Division)	6,852	6,425	6,425	196,952	30.65					
	Minidoka	180,100	168,887	168,887	5,005,547	29.64	739,148	694,150	656,099	20,581,232	31.37
	Minidoka Irrigation District	70,011	60,567	60,567	2,035,913	33.61					
	Burley Irrigation District	47,938	46,169	46,169	1,645,989	35.65					
	Gooding Division	62,151	62,151	62,151	1,323,645	21.30					
Montana	Bitter Root	16,532	15,841	15,841	316,922	19.89					
	Frenchtown	4,878	1,327	1,743	26,239	15.05					
	Humbley	29,501	23,262	16,613	673,218	40.53					
	Milk River	136,704	59,712	57,199	1,280,027	22.54					
	Malta Division	58,799	24,285	17,855	422,820	23.68					
	Glasgow Division	22,133	8,707	8,258	130,718	15.83					
	Chinook	55,772	26,720	31,086	735,489	23.66					

BUREAU OF RECLAMATION

[illegible]

1. Area for which the Bureau was prepared to supply water in 1938.

² See interpretation of Subsection F of Act of December 5, 1924 (43 Stat. 672) as outlined in Circular Letter No. 2324, February 15, 1937.

• Estimated.

Owyhee Ditch Co. lands.

Irrigation and Crop Results on Government Projects, 1938—Continued

State	Projects and divisions	Lands on projects covered by crop census					Other lands served by Government works, usually by a partial water supply through private canals under Warren Act or other water-service contracts. (See Reclamation table No. 23 for detailed break-down.)				
		Irrigable acreage	Irrigated acreage	Area in cultivation	Crop value		Irrigable acreage	Irrigated acreage	Area in cultivation	Crop value	
					Total	Per acre				Total	Per acre
Oregon-Idaho.....	Ontario-Nyssa Irrigation District.....	5,690	5,181	5,236	\$209,311	\$39.98					
	Gem Irrigation District.....	25,872	19,188	19,200	581,480	30.29					
	Slide Irrigation District.....	320	236	236	8,859	37.54					
	Belle Fourche.....	72,572	40,612	40,612	901,302	22.19					
South Dakota.....	Weber River (Salt Lake Basin).....	8,324	5,934	5,934	207,705	35.00					
	Hvrum.....										
	Ogden River.....										
	Saugate (Ephraim Division).....										
Utah.....	Strawberry Valley.....	42,433	39,466	39,370	932,527	23.69					
	Highline Division.....	19,011	17,853	17,757	323,492	18.22					
	Spanish Fork Division.....	14,327	13,608	13,608	351,836	25.86	8,224	7,813	7,813	210,097	26.89
	Springville-Mapleton Division.....	9,095	8,005	8,005	257,199	32.13					
Washington.....	Okanogan.....	7,739	3,773	3,742	447,306	119.54					
	Yakima.....	205,161	163,831	166,347	7,569,036	45.50	188,677	157,332	157,438	8,115,154	51.55
	Sunnyside Division.....	105,438	81,800	83,863	3,242,351	38.66					
	Tieton Division.....	28,537	25,322	25,202	3,064,908	121.61					
Wyoming.....	Kitittus Division.....	70,186	56,709	57,282	1,261,777	22.03					
	Riverton.....	32,000	25,905	26,095	471,773	18.08	273	273	273	3,482	12.75
	Shoshone.....	73,716	57,247	55,904	1,103,207	19.73					
	Garland Division (Shoshone Irrigation District).....	41,902	33,805	33,386	777,915	23.30					
	Frannie Division (Deaver Irrigation District).....	20,041	13,686	12,863	181,267	14.09					
	Willwood Division.....	11,773	9,756	9,655	144,035	14.92					
	Total, all regular projects 1938.....	2,275,882	1,777,584	1,764,363	67,859,804	38.47					
	Warren Act lands, 1938.....	1,507,051	1,329,115	1,276,332	45,603,656	35.73	1,507,051	1,329,115	1,276,332	45,603,656	35.73
	Grand total regular projects and Warren Act.....	3,782,933	3,106,699	3,040,695	113,463,460	37.31					
	Grand total, 1937.....	3,766,212	3,114,801	3,034,761	118,658,272	39.09					
	+ Increase or - decrease.....	+16,721	-8,102	+5,934	-5,194,812	-1.78					

Irrigated and Cropped Acreages and Accumulated Crop Values by Years, 1906-38

Year	Federal irrigation projects				Warren Act lands				Entire area		
	Irrigated acreage	Cropped acreage	Crop value		Irrigated acreage	Cropped acreage	Crop value		Irrigated acreage	Cropped acreage	Crop value
			For year	Cumulative total			For year	Cumulative total			
1906	22,300	120,100	\$244,900	\$5,005,360	---	---	---	---	22,300	120,100	\$244,900
1907	187,628	1,169,000	4,760,400	12,641,248	---	---	---	---	187,628	1,169,000	4,760,400
1908	280,549	1,260,500	7,635,888	24,561,911	---	---	---	---	280,549	1,260,500	7,635,888
1909	410,628	1,369,500	11,920,663	37,506,550	---	---	---	---	410,628	1,369,500	11,920,663
1910	471,423	1,470,100	12,944,639	50,502,901	---	---	---	---	471,423	1,470,100	12,944,639
1911	562,311	1,570,000	13,086,441	63,589,342	---	---	---	---	562,311	1,570,000	13,086,441
1912	614,477	1,670,000	16,007,134	79,596,476	---	---	---	---	614,477	1,670,000	16,007,134
1913	684,142	1,760,000	15,676,409	95,272,885	---	---	---	---	684,142	1,760,000	15,676,409
1914	761,271	1,850,000	16,475,317	111,748,202	---	---	---	---	761,271	1,850,000	16,475,317
1915	810,649	1,940,000	18,164,452	129,912,654	---	---	---	---	810,649	1,940,000	18,164,452
1916	922,821	2,030,000	32,815,972	162,728,626	---	---	---	---	922,821	2,030,000	32,815,972
1917	1,026,663	2,120,000	56,462,313	219,190,939	---	---	---	---	1,026,663	2,120,000	56,462,313
1918	1,119,566	2,210,000	66,821,396	286,012,335	---	---	---	---	1,119,566	2,210,000	66,821,396
1919	1,187,255	2,300,000	88,974,137	374,986,472	---	---	---	---	1,187,255	2,300,000	88,974,137
1920	1,223,480	2,390,000	96,171,650	471,158,122	---	---	---	---	1,223,480	2,390,000	96,171,650
1921	1,227,500	2,480,000	49,620,300	520,778,422	---	---	---	---	1,227,500	2,480,000	49,620,300
1922	1,202,130	2,570,000	50,360,850	571,139,272	---	---	---	---	1,202,130	2,570,000	50,360,850
1923	1,213,700	2,660,000	65,046,300	636,185,572	---	---	---	---	1,213,700	2,660,000	65,046,300
1924	1,230,800	2,750,000	66,488,560	702,674,132	---	---	---	---	1,230,800	2,750,000	66,488,560
1925	1,320,300	2,840,000	77,608,880	780,283,012	---	---	---	---	1,320,300	2,840,000	77,608,880
1926	1,411,020	2,930,000	80,369,620	860,652,632	---	---	---	---	1,411,020	2,930,000	80,369,620
1927	1,378,960	3,020,000	70,983,450	931,636,082	---	---	---	---	1,378,960	3,020,000	70,983,450
1928	1,442,080	3,110,000	80,288,800	1,011,924,882	---	---	---	---	1,442,080	3,110,000	80,288,800
1929	1,483,900	3,200,000	87,559,670	1,099,484,552	---	---	---	---	1,483,900	3,200,000	87,559,670
1930	1,504,810	3,290,000	94,318,940	1,193,803,492	---	---	---	---	1,504,810	3,290,000	94,318,940
1931	1,522,718	3,380,000	101,121,089	1,294,925,581	---	---	---	---	1,522,718	3,380,000	101,121,089
1932	1,555,144	3,470,000	116,752,752	1,411,678,333	---	---	---	---	1,555,144	3,470,000	116,752,752
1933	1,589,770	3,560,000	138,328,576	1,550,006,909	---	---	---	---	1,589,770	3,560,000	138,328,576
1934	1,552,124	3,650,000	59,628,327	1,609,635,236	---	---	---	---	1,552,124	3,650,000	59,628,327
1935	1,640,936	3,740,000	60,166,663	1,669,801,900	---	---	---	---	1,640,936	3,740,000	60,166,663
1936	1,702,192	3,830,000	78,902,818	1,748,704,718	---	---	---	---	1,702,192	3,830,000	78,902,818
1937	1,725,463	3,920,000	72,893,619	1,821,598,337	---	---	---	---	1,725,463	3,920,000	72,893,619
1938	1,777,584	4,010,000	67,859,804	1,889,458,141	---	---	---	---	1,777,584	4,010,000	67,859,804

1 Estimated.

Does not include acreages of lands cropped without irrigation and crop values therefrom.

SECONDARY AND GENERAL INVESTIGATIONS

Investigations of 79 potential projects were in progress during the fiscal year by the Bureau of Reclamation. Allotments of emergency funds and regular appropriations were being used.

The investigations are generally limited to (a) examinations of individual projects, including land classification, reservoir and canal surveys, economic and water-supply studies, (b) reconnaissance surveys of stream basins to determine irrigation potentialities within those basins, and (c) basin-wide surveys, including reconnaissance and examination of individual projects within the basin. The largest and practically the only basin-wide survey undertaken by the Bureau is that of the Colorado River Basin, the examination of which was authorized by section 15 of the Boulder Canyon Project Act approved December 21, 1928, which directs that investigation and public reports be made of the feasibility of projects for irrigation, generation of electrical power, and other purposes in the States of Arizona, Nevada, Colorado, New Mexico, Utah, and Wyoming.

Arizona**Colorado Basin surveys:**

Little Colorado River: Land classification completed; reservoir and canal surveys and water-supply and economic studies in progress.

Hassayampa River: Classification completed; reservoir and canal surveys and water-supply and economic studies in progress.

Williams River: Land classification completed; reservoir and canal surveys and water-supply and economic studies in progress.

Arizona-California

Colorado Basin surveys: Palo Verde and Cibola Valleys: Land classification in progress.

California**Colorado Basin surveys:**

Palo Verde flood conditions report completed.

Chuckawalla Valleys: Land classification in progress.

Kings River: Field work completed and report in preparation.

Colorado**Colorado Basin surveys:****Western slope surveys:**

Mancos (Mesa Verde National Park water supply): Field surveys in progress.

Florida Mesa: Preliminary draft of report completed.

Paonia (North Fork): Report completed.

Silt: Land classification completed; field surveys and water-supply and economic studies in progress.

Roan Creek: Field surveys practically completed; water-supply and economic studies in progress.

Colorado Basin surveys—Continued.

Western slope surveys—Continued.

Troublesome: Field surveys practically completed; water-supply and economic studies in progress.

Piceance: Field surveys practically completed; water-supply and economic studies in progress.

Collbran: Field surveys practically completed; water-supply and economic studies in progress.

Rifle: Field surveys practically completed; water-supply and economic studies in progress.

La Plata: Field surveys practically completed; water-supply and economic studies in progress.

Yampa below Yampa, Colorado: Land classification completed; field surveys, water-supply and economic studies in progress.

Blue River-Platte River transmountain diversions: All field surveys and water-supply and economic studies completed; report in preparation.

Eastern slope surveys:

North Republican: Report in preparation.

Arikaree: Field surveys practically completed; water-supply and economic studies in progress.

South Republican: Field surveys practically completed; water-supply and economic studies in progress.

Smoky Hill: Field surveys practically completed; water-supply and economic studies in progress.

Huerfano: Field surveys practically completed; water-supply and economic studies in progress.

Apishapa River: Field surveys practically completed; water-supply and economic studies in progress.

Hugo and Chivington: Report completed.

Trinidad (Purgatoire): Preliminary draft of report completed.

Colorado-Kansas

Arkansas Valley: Field surveys and water-supply and economic studies in progress.

Colorado-New Mexico

San Juan Basin surveys: Field surveys and water-supply and economic studies in progress.

Idaho

Southwestern Idaho investigations: Detailed surveys of Twin Springs reservoir site in progress; progress report on Payette watershed completed; field surveys of Weiser Basin in progress; land classification of Mountain Home area practically completed.

South Fork of the Snake River: Field surveys and water-supply and economic studies completed; report in preparation.

Salmon River reconnaissance: Report submitted.

Rathdrum Prairie: Supplemental report completed.

Cabinet Gorge power: Report submitted.

Idaho-Montana

Madison River-Snake River diversion: Studies in connection with Madison River irrigation in progress.

Montana

Gallatin Valley: Water-supply and economic studies in progress; all field work except that in connection with the Canyon Ferry dam site completed.

Marias: Report completed.

Rock Creek (Valley County): All field work completed; water-supply and economic studies in progress.

Fort Peck pumping: Land classification and canal surveys practically completed; water-supply studies, transmission-line surveys and economic studies in progress.

Nebraska

Mirage Flats project: Field work and the studies of water-supply and economic condition completed; structural designs and report in preparation.

Nevada

Humboldt River: Water-supply studies in progress.

Quinn Valley Reconnaissance: Examination in progress.

Nevada-Arizona

Bullshead Reservoir: Topographic surveys and geological explorations in progress.

North Dakota

Missouri River tributaries: Field work and water-supply and economic studies in progress.

North Dakota-South Dakota

Missouri River pumping projects: Field surveys of several individual areas in progress; water-supply and economic studies in progress; report on Bismarck area in progress.

Oklahoma

Lugert-Altus: Economic survey and report by Department of Agriculture completed; flood-control studies by Corps of Engineers completed; studies in connection with correlation of the reports by the Bureau of Reclamation, Department of Agriculture, and the Corps of Engineers in progress.

Kenton project: Preliminary report submitted.

North Canadian River Investigations (includes Fort Supply, Optima, and Canton areas): All field work completed; economic and water-supply studies in progress; a preliminary progress report on the Fort Supply area submitted.

Mangum project: A reconnaissance report in cooperation with the Corps of Engineers submitted.

Washita reconnaissance: Field work in progress.

Oregon

Grande Ronde project: All field work practically completed; water-supply and economic studies in progress.

Medford project: All field work completed; draft of report completed.

Canby project: Preliminary report completed.

South Dakota

Rapid Valley project: Supplemental field work in progress.

Angostura project: Supplemental field work in progress.

Gavins Point project: Reconnaissance with Corps of Engineers report submitted.
Shadehill project: Water-supply quality investigation completed; project progress report submitted.

Buffalo Gap (Beaver Creek): Field work and water-supply and economic studies in progress.

Texas

Balmorea project: Detailed field surveys and water-supply and economic studies in progress.

Robert Lee project: Detailed surveys and water-supply and economic studies in progress.

Lower Colorado River flood survey: Report submitted.

Pease River-Cap Rock project: Reconnaissance with Corps of Engineers report submitted.

Utah

Colorado River Survey:

Price-Gooseberry, Blue Bench, and Ouray projects: Field surveys and water-supply and economic studies in progress.

Salt Lake Basin cooperative surveys—Weber River, Woodruff, Newton, Big Creek, Otter Creek, and Beaver Creek projects: Field work and water-supply and economic studies in preparation.

Washington

Columbia Basin project: Land classification and land-appraisal surveys in progress.

Wyoming

Colorado Basin surveys:

Green River projects including Lyman, Pinedale, and Seedskadie: Field work and water-supply and economic studies in progress.

Wyoming-Utah-Idaho

Green River-Bear River diversion: Reservoir and canal surveys practically completed; water-supply and economic studies in progress.

CIVILIAN CONSERVATION CORPS

During the fiscal year 10 additional C. C. C. camps were allocated to the Bureau of Reclamation, bringing to 44 the total number of camps engaged on work programs directly related to the western irrigation developments of the Federal Government. The increase in the number of camps, although small, has permitted the program of rehabilitation of reclamation projects to proceed and has provided the facilities to undertake new projects of importance.

C. C. C. camps were established for the first time on an all-year basis on the Milk River and Sun River projects, Montana; Orland project, California; and the Yakima project, Washington. Construction of the Deschutes reclamation project in central Oregon began in July 1938 with the assignment of three C. C. C. camps to aid the regular service in development of the project. The 5-year program

of cleaning the reservoir area, upstream from Shasta Dam on the Central Valley project in northern California, was started in the fall of 1938 with the establishment of two C. C. C. camps at Baird.

Reconstruction of the upper embankment of the Deer Flât Reservoir on the Boise project concluded the rehabilitation, begun in 1936, of this important water-storage basin. The new C. C. C. camp at Malta, Mont., restored the irrigation system of the Milk River project following the record Milk River flood in March. Salvage of the old Government-constructed railroad to the Owyhee Dam in eastern Oregon was completed during the year with C. C. C. forces, the railroad right-of-way being regraded for highway use to permit access to this important structure by Government employees.

Permanency has characterized the type of work comprising the C. C. C. program on reclamation projects. Many small but essential water-control structures varying from concrete farm turn-outs to concrete-pipe siphons were built by the enrollees. Demonstrations of practical methods of weed control to eliminate the noxious varieties from the Federal projects were continued. Public buildings at the large recreational development at Elephant Butte Reservoir in New Mexico were placed in service.

The training of C. C. C. enrollees to fit them for gainful employment in civilian life was given particular attention during the year. A complete job-training program was secured by instruction on the job, supplemented by related classroom work held in the camps in the evenings.

ORGANIZATION

The Commissioner, appointed by the President and under the supervision of the Secretary, is in administrative charge of the Bureau of Reclamation. He is supported by a staff of 121 officers and employees in Washington. The Chief Engineer at Denver, Colo., assisted by 967 employees, is in general supervision of the engineering and construction activities. Twenty-two construction engineers in charge of projects now under construction, 4 engineers, a director of power at Boulder City, Nev., and 3 supervising engineers, located at Coulee Dam, Wash., Sacramento, Calif., and Estes Park, Colo., report to the Chief Engineer. Seventeen superintendents and engineers in charge of completed projects report to the Supervisor of Operation and Maintenance at Washington. The 53 field offices, including the Denver office and 5 field legal offices, have a combined personnel of 6,148.

Harry W. Bashore was appointed Assistant Commissioner during the fiscal year to succeed Roy B. Williams, who left Washington to become construction engineer at Friant Dam, Calif.

RECLAMATION TABLE 1.—Consolidated Financial Statement, June 30, 1939

DEBIT SIDE

Construction account:

Primary projects:

Cost of irrigation works:

Original construction.....	\$381,467,881.95
Supplemental construction.....	12,718,343.22
Value of works taken over.....	2,220,891.21

Total construction cost..... 396,387,116.38

Operation and maintenance prior to public notice, net \$3,147,094.48

Operation and maintenance deficits and arrearages
funded with construction..... 5,855,823.45

Penalties on water-right charges funded with con-
struction..... 3,247,972.23

12,250,890.16

Total..... 408,638,006.54

Less income items:

Construction revenues..... \$7,792,641.58

Contributed funds..... 1,946,358.83

Nonreimbursable appropriation, Rio Grande

Dam..... 1,000,000.00

10,739,000.41

397,899,006.13

Less abandoned works, nonreimbursable cost and charge-offs..... 17,133,900.70

Balance payable..... \$380,765,105.43

Palo Verde flood protection, cost of construction and repairs..... 48,806.46

Secondary projects and general investigations:

Cost of surveys and investigations..... \$4,881,956.59

Less contributed funds..... 620,838.41

4,261,118.18

General offices expense undistributed..... 2,085,952.73

Plant and equipment..... 2,501,755.66

Materials and supplies..... 5,331,954.52

Accounts receivable:

Current accounts..... \$2,102,190.89

Deferred accounts..... 247,815,754.31

249,917,945.20

Undistributed clearing cost accounts..... 932,712.01

Unadjusted debits, disbursement vouchers in transit..... 34,956.88

Cash:

Balance on hand:

Reclamation fund..... \$21,862,367.18

General fund..... 66,923,142.24

National Industrial Recovery and P. W. A. allotments..... 10,703,468.30

Emergency Relief allotments..... 1,490,295.76

Funds transferred from other departments..... 27,544.75

Contributed funds..... 92,935.28

101,099,753.51

In special deposit account..... 46,655.50

101,146,409.01

Total debits..... 747,026,716.08

CREDIT SIDE

Security for repayment of cost of irrigation works: Contracted construction repayments.... \$299,726,969.80

Current accounts payable..... 7,590,304.65

Deferred and contingent obligations..... 1,092,269.46

Reserves and undistributed profits..... 11,128,048.47

RECLAMATION TABLE 1.—Consolidated Financial Statement, June 30, 1939—Con.

CREDIT SIDE—Continued

Operation and maintenance results, surplus.....		\$816,795.39
Unadjusted credits, collection vouchers in transit.....		¹ 4,851.28
Government aid for reclamation of arid lands:		
Reclamation fund.....	\$202,728,224.76	
Advances to reclamation fund:		
Treasury loan (Act of June 25, 1910).....	\$20,000,000.00	
Less amount repaid.....	20,000,000.00	
Treasury loan (Act of Mar. 4, 1931).....	5,000,000.00	
Less amount repaid.....	5,000,000.00	
National Industrial Recovery and P. W. A. allotments.....	73,421,000.00	
Emergency Relief allotments.....	48,372,012.28	
Funds transferred from other departments.....	4,092,738.05	
General fund:		
Central Valley project.....	38,400,000.00	
Grand Coulee Dam.....	69,750,000.00	
Water Conservation and Utility projects.....	5,000,000.00	
Other appropriations.....	7,598,666.12	
	449,362,641.21	
Less nonreimbursable appropriation, Rio Grande Dam.....	1,000,000.00	
	448,362,641.21	
Less impairment of funds:		
Abandoned works.....	\$2,829,884.62	
Nonreimbursable construction cost.....	881,647.73	
Operation and maintenance cost uncollectible.....	453,272.39	
Attendance at meetings.....	1,815.90	
Giving information to settlers, cost.....	11,238.17	
Prepaid civil service retirement funds.....	2,340.33	
Operation and maintenance administration.....	39,541.39	
Washington office cost since Dec. 5, 1924.....	2,504,732.15	
Charge-offs (Act of May 25, 1926).....	14,699,308.24	
Returned to Treasury, miscellaneous receipts.....	128.65	
	21,423,909.57	
	426,938,731.64	
Less impounded funds, economy acts.....	261,552.05	
	426,677,179.59	
Total credits.....		747,026,716.08

¹ Contra.

RECLAMATION TABLE 2.—Consolidated Statement by Projects of Construction Cost of Irrigation Works, Other Items Reimbursable With Construction, and Amounts Repayable

State and project	Construction cost		Operation and main- tenance before pub- lic notice (net)		Operation and main- tenance deficits and pen- alties		Construction revenues, contributed funds, and nonreimbursable appropriation (con- tra)		Abandoned works, non- reimburs- able cost and authorized charge-offs	Total repayable	
	Fiscal year 1939	To June 30, 1939	Fiscal year 1939	To June 30, 1939	Fiscal year 1939	To June 30, 1939	Fiscal year 1939	To June 30, 1939		Fiscal year 1939	To June 30, 1939
Arizona:											
Gila:											
Salt River	\$1,157,133.84	\$4,192,411.36								\$1,157,133.84	\$4,192,411.36
Yuma Auxiliary	1,944,439.31	19,901,133.89								1,944,439.31	18,406,013.29
Yuma Auxiliary		902,060.50								901,565.39	9,723,140.06
California:											
Central Valley	14,854,275.81	17,624,335.46								14,854,275.81	17,624,335.46
Orland	47,620.14	2,448,669.71								49,383.63	2,468,167.04
Colorado:											
Colorado-Big Thompson	2,179,322.25	2,402,394.51								2,178,843.83	2,401,916.09
Fruit Growers Reservoir	122,667.28	152,298.47								122,667.28	152,298.47
Grand Valley	321.39	5,020,612.73								321.39	4,081,695.94
Pine River	1,008,187.00	1,263,595.22								1,007,667.00	1,263,075.22
Uncompahgre	216,213.62	8,582,682.62								216,213.62	7,804,433.75
Idaho:											
Boise	113,383.54	16,799,780.25								82,393.84	17,175,769.61
Boise-Payette	1,083,431.19	2,870,036.40								1,081,942.64	2,808,547.85
King Hill		1,905,918.80								1,987,854.04	
Mindoka	1,171.96	19,230,344.94								1,007,667.00	1,263,075.22
Upper Snake River	518,153.57	2,524,738.60								216,213.62	7,804,433.75
Kansas:											
Garden City		312,963.68								61,356.82	
Montana:											
Bitter Root		947,641.05								37,784.32	17,175,769.61
Buffalo Rapids	921,102.75	1,107,369.17								1,081,942.64	2,808,547.85
Chain Lakes	461,589.57	1,229,805.25								1,081,942.64	2,808,547.85
Frenchtown	886.88	264,159.65								1,081,942.64	2,808,547.85
Huntley		1,559,590.46								1,081,942.64	2,808,547.85
Milk River	699.56	6,924,891.06								1,081,942.64	2,808,547.85
Sun River	345,681.73	8,907,493.76								1,081,942.64	2,808,547.85
Montana-North Dakota:											
Lower Yellowstone		3,685,433.14								1,081,942.64	2,808,547.85
Nebraska:											
Yellowstone		19,383,100.98								1,081,942.64	2,808,547.85
North Platte	51,396.86									1,081,942.64	2,808,547.85

BOULDER CANYON PROJECT

RECLAMATION TABLE 3.—Financial Statement June 30, 1939

ASSETS AND OTHER DEBITS

I. INVESTMENTS

102	Fixed capital under construction.....	\$116, 128, 134. 91	
103	Other physical properties.....	1, 430, 492. 17	
104	Investigations, Colorado River Basin.....	232, 205. 65	
104	Investigations, Parker-Gila project.....	75, 350. 64	
105	Other capital expenditures—Interest during construction.....	18, 615, 492. 69	
106	Earnings and expenses during construction.....	¹ 571, 794. 20	
Total investments.....			\$135, 909, 881. 82

II. CURRENT AND ACCRUED ASSETS

121	Treasury cash:		
	For advances to Colorado River Dam fund.....	\$3, 500, 000. 00	
	Colorado River Dam fund.....	32, 730. 62	
	N. I. R. A.—Parker-Gila project.....	8, 098. 42	
	Collections in transit.....	500, 307. 47	
	Total Treasury cash.....	4, 041, 136. 51	
122	Disbursing officer's cash.....	490, 007. 76	
124	Accounts receivable.....	22, 528. 96	
Total current and accrued assets.....			4, 553, 673. 23

IV. DEFERRED AND UNADJUSTED DEBITS

141	Clearing and apportionment accounts.....	¹ \$197, 275. 02	
143	Field cost adjustments.....	10, 642. 54	
145	Jobbing accounts.....	54, 514. 89	
146	Prepayments.....		
171	Unadjusted debits.....	¹ 6, 920. 22	
Total deferred and unadjusted debits.....			¹ 139, 037. 81
Total assets and other debits.....			140, 324, 517. 28

LIABILITIES AND OTHER CREDITS

X. CAPITAL AND LONG-TERM LIABILITY

205	Long-term liability—U. S. Treasury authorized appropriation....	\$126, 500, 000. 00	
161	Less: Authorized but not appropriated.....	5, 190, 000. 00	
Total long-term liability:			
205. 2	Appropriated but not advanced.....	3, 500, 000. 00	
205. 3	Appropriated and advanced.....	117, 810, 000. 00	
205. 4	Less: Impounded, Legislative Economy Act.....	¹ 137, 653. 66	
206	N. I. R. A. allotment Parker-Gila project.....	93, 000. 00	
207	Interest on advances to Colorado River Dam fund.....	18, 589, 861. 11	
208	Judgments—Court of Claims.....	37, 766. 29	
			139, 892, 973. 74

XI. CURRENT AND ACCRUED LIABILITIES

211	Audited accounts payable:		
211. 1	Contractors—current.....		
211. 11	Contractors earnings—holdback.....		
211. 2	Labor.....	\$62, 083. 63	
211. 3	Purchases.....	14, 583. 25	
211. 4	Freight and express.....	58, 661. 58	
211. 5	Passenger fares.....	609. 65	
211. 6	Rights-of-way.....		

¹ Contra.

BOULDER CANYON PROJECT

RECLAMATION TABLE 3.—Financial Statement June 30, 1939—Continued

XI. CURRENT AND ACCRUED LIABILITIES—Continued

211.9	Miscellaneous.....	\$4, 110. 68	
211.91	Refunds.....		
	Total audited accounts payable.....	140, 048. 79	
219	Accrued interest.....		
	Total current and accrued liabilities.....		\$140, 048. 79

XIII. DEFERRED AND UNADJUSTED CREDITS

231	Unadjusted credits.....		10, 974. 14
-----	-------------------------	--	-------------

XV. RESERVES

258	Reserve for amortization of long-term debt and payment to States.....	280, 520. 61	
	Total liabilities and other credits.....		140, 324, 517. 28

BOULDER CANYON PROJECT

RECLAMATION TABLE 4.—Appropriations and Cash Statement June 30, 1939

	Regular appropriation	N. I. R. A. allotment	Total	N. I. R. A. Parker-Gila project
TREASURY CASH				
Appropriations and allotments.....	\$83, 310, 000. 00	\$38, 000, 000. 00	\$121, 310, 000. 00	\$93, 000. 00
Advances to Colorado River Dam fund.....	79, 810, 000. 00	38, 000, 000. 00	117, 810, 000. 00	
Balance not advanced.....	3, 500, 000. 00		3, 500, 000. 00	
Colorado River Dam fund:				
Advanced from appropriation to fund.....	79, 810, 000. 00	38, 000, 000. 00	117, 810, 000. 00	
Collections deposited in fund.....	7, 702, 293. 94	23, 013. 63	7, 725, 307. 57	5, 176. 67
Total advances and collections.....	87, 512, 293. 94	38, 023, 013. 63	125, 535, 307. 57	98, 176. 67
Transfer to miscellaneous receipts, Treasury.....	6, 500, 000. 00		6, 500, 000. 00	
Disbursements by General Accounting Office.....	4, 983, 345. 66	54, 723. 63	5, 038, 069. 29	
Advances to disbursing officers.....	75, 996, 427. 98	37, 968, 079. 68	113, 964, 507. 66	90, 078. 25
Total withdrawals.....	87, 479, 773. 64	38, 512, 803. 31	125, 502, 576. 95	90, 078. 25
Balance.....	32, 520. 30	210. 32	32, 730. 62	8, 098. 42
Repay collections in transit.....	484. 18		484. 18	
Miscellaneous collections in transit.....	499, 823. 29		499, 823. 29	
Total Treasury cash (G. L. 121).....	532, 827. 77	210. 32	533, 038. 09	8, 098. 42
DISBURSING OFFICERS' CASH				
Advances and appropriation transfer adjustments.....	76, 006, 661. 87	37, 974, 709. 56	113, 981, 371. 43	90, 078. 25
Disbursements by disbursing officers.....	75, 522, 407. 46	37, 974, 481. 10	113, 496, 888. 56	84, 631. 41
Disbursing officers' checking.....	484, 254. 41	228. 46	484, 482. 87	5, 446. 84
Collections by disbursing officers.....	8, 204, 754. 97	29, 392. 51	8, 234, 147. 48	5, 176. 67
Collections deposited and appropriation transfer.....	8, 204, 676. 92	29, 392. 51	8, 234, 069. 43	5, 176. 67
Collections not deposited.....	78. 05		78. 05	
Total disbursing officers' cash (G. L. 122).....	484, 332. 46	228. 46	484, 560. 92	5, 446. 84

ALL-AMERICAN CANAL

RECLAMATION TABLE 5.—Financial Statement June 30, 1939

ASSETS AND OTHER DEBITS

I. INVESTMENTS

102 Fixed capital under construction.....	\$26,544,758.99
---	-----------------

II. CURRENT AND ACCRUED ASSETS

121 Treasury cash:

For advances to Colorado River Dam fund.....	\$2,450,000.00
Colorado River Dam fund.....	81,789.54
P. W. A., N. I. R. A., and E. R. A. allotments.....	323,240.41
Contributions—Imperial Irrigation District.....	26,287.54
Collections in transit.....	894.42

Total Treasury cash.....	2,882,211.91
--------------------------	--------------

122 Disbursing officers' cash.....	1,264,653.70
------------------------------------	--------------

124 Accounts receivable.....	178,126.13
------------------------------	------------

Total current and accrued assets.....	4,324,991.74
---------------------------------------	--------------

IV. DEFERRED AND UNADJUSTED DEBITS

141 Clearing and apportionment accounts.....	\$11,950.23
--	-------------

143 Field cost adjustment.....	49,295.06
--------------------------------	-----------

171 Unadjusted debits.....	4,115.21
----------------------------	----------

Total deferred and unadjusted debits.....	65,360.50
---	-----------

Total assets and other debits.....	30,935,111.23
------------------------------------	---------------

LIABILITIES AND OTHER CREDITS

X. CAPITAL AND LONG-TERM LIABILITY

205 Long-term liability—U. S. Treasury authorized appropriation.....	\$38,500,000.00
--	-----------------

Less:

161 Authorized but not appropriated.....	8,000,000.00
--	--------------

Total long-term liability:

205.2 Appropriated but not advanced.....	2,450,000.00
--	--------------

205.3 Appropriated and advanced.....	28,050,000.00
--------------------------------------	---------------

	\$30,500,000.00
--	-----------------

XI. CURRENT AND ACCRUED LIABILITIES

211 Audited accounts payable:

211.1 Contractors' earnings—current.....	\$199,296.77
--	--------------

211.11 Contractors' earnings—hold-back.....	98,657.57
---	-----------

211.2 Labor.....	15,827.54
------------------	-----------

211.3 Purchases.....	4,579.73
----------------------	----------

211.4 Freight and express.....	39,964.30
--------------------------------	-----------

211.5 Passenger fares.....	135.50
----------------------------	--------

211.6 Rights-of-way.....	
--------------------------	--

211.9 Miscellaneous.....	69.54
--------------------------	-------

211.91 Refunds.....	248.47
---------------------	--------

Total Current and Accrued Liabilities.....	353,779.42
--	------------

XII. OTHER CREDITS

226 Contributed funds—Imperial and Coachella irrigation districts.....	70,000.00
--	-----------

XIII. DEFERRED AND UNADJUSTED CREDITS

231 Unadjusted credits.....	\$4,319.71
-----------------------------	------------

231.3 Unadjusted credits, Yuma project.....	44.49
---	-------

Total Deferred Unadjusted Credits.....	4,364.30
--	----------

XV. APPROPRIATED SURPLUS

251 Appropriated surplus not specifically invested.....	1,967.71
---	----------

Total Liabilities and Other Credits.....	30,935,111.23
--	---------------

ALL-AMERICAN CANAL
RECLAMATION TABLE 6.—Appropriation and Cash Statement June 30, 1939

	N. I. R. A. allotment	P. W. A. allotment	Emergency relief allot- ment	1938 P. W. A. allotments	Regular appropriation	Contributed funds
TREASURY CASH						
Appropriations.....						
Advances to Colorado River Dam fund.....					\$10,500,000.00	
Balance not advanced.....					8,050,000.00	
Colorado River Dam fund.....					2,450,000.00	
Advances to Colorado River Dam fund allotments and contributed funds.....	\$6,000,000.00	\$3,000,000.00	\$10,000,000.00	\$1,000,000.00	8,050,000.00	\$70,000.00
Collections deposited.....	18,847.52	3,090.60	23,283.90		282,719.95	
Total advances, allotments, etc.....	6,018,847.52	3,003,090.60	10,023,283.90	1,000,000.00	8,332,719.95	70,000.00
Disbursements by General Accounting Office.....	61,164.24	16.17	551.97		3,930.41	
Advances to disbursing officers and disbursements.....	5,953,703.36	2,993,497.18	10,020,000.00	693,048.69	8,247,000.00	43,712.46
Total withdrawals.....	6,014,867.60	2,993,513.35	10,020,551.97	693,048.69	8,250,930.41	43,712.46
Balance.....	3,979.92	9,577.25	2,731.93	306,951.31	81,789.54	26,287.54
Repay collections in transit.....	47.84				88.35	
Miscellaneous collections in transit.....					758.23	
Total Treasury cash (G. L. 121).....	4,027.76	9,577.25	2,731.93	306,951.31	82,636.12	26,287.54
DISBURSING OFFICERS' CASH						
Advances and appropriation transfer adjustments.....	5,953,878.34	2,993,497.18	10,020,000.00		8,247,000.00	
Disbursements by disbursing officers.....	5,868,582.95	2,887,396.61	9,868,448.61		7,825,354.55	
Disbursing officers' check balance.....	85,295.39	106,100.57	151,551.39		921,645.45	
Collections by disbursing officers.....	18,999.59	3,090.60	23,283.90		283,627.43	
Collections deposited and appropriation transfer.....	18,999.59	3,090.60	23,283.90		283,566.53	
Collections not deposited.....					60.90	
Disbursing officers' cash balance.....	85,295.39	106,100.57	151,551.39		921,706.35	

BUREAU OF MINES

John W. Finch, *Director*

THE general purpose of the Bureau of Mines is to conduct, in behalf of the public welfare, fundamental inquiries and investigations regarding the mining industry. These are national in scope, and seek development of methods that will promote the upbuilding and permanence of the industry as a whole and the conservation of our national resources by increasing safety, efficiency, and economic development in the mining, quarrying, metallurgical, and miscellaneous mineral industries of the country. The inquiries and investigations may be divided into three main categories relating to economics, safety, and technology.

In the field of economics, much attention has been focused upon mineral self-sufficiency, as a result of the present interest in national defense. Persons who think in terms of airplanes, machine guns, and tanks when armament is discussed frequently overlook the fact that manufacture of such equipment necessitates the assembling of a wide variety of raw materials and that among the most important of these are the so-called "strategic minerals," such as manganese, chromium, tungsten, mercury, and molybdenum. The value of maintaining cumulative historical data on production, consumption, sources, prices, and stocks of strategic minerals seldom has been justified more completely than when the Army and Navy Munitions Board called upon the Bureau for detailed information of this nature covering metals and nonmetallic minerals on its "critical" and "essential" lists.

The place of nations in the economic sun is dependent largely upon their supplies of the two vital minerals, coal and iron. By visits to the principal industrial countries of Europe the Bureau's foreign-minerals specialist obtained first-hand information on the resources of and demand for these commodities and embodied these data in a paper that was published while the material was still most timely.

When the Bureau was organized—at the beginning of the fiscal year 1911—major mine disasters (catastrophes in which at least 5 men were killed) occurred all too frequently and exacted an annual toll of more than 600 lives. The first year of the Bureau's existence was darkened by 17 major disasters, which killed 464 miners in all. Improvement seemed painfully slow for the first two dec-



OIL FOR AMERICA.

Better methods for extracting petroleum is one of the major concerns of the Bureau of Mines.



ades, but the third witnessed heartening progress. It is therefore a pleasure to announce that the fiscal year 1939 was the first since statistics have been on record in which there was no major mine disaster.

The Bureau of Mines has claimed that mining can be a safe occupation if operators and miners cooperate to make it so. Many mines and plants have operated for at least 1,000,000 man-hours without a lost-time accident, as the data submitted for the annual mine safety competitions have proved. The achievements of 1939 are believed to be all the more remarkable because the increased use of electrical equipment and mechanized mining introduces hazards unknown in the first part of this century.

Another record was broken during the year; 120,733 persons in the mineral and allied industries earned certificates to show that they had completed Bureau of Mines courses in mine rescue and first aid, the largest number ever trained in a 12-month period. In 1911, the first year such training was offered, 509 persons received certificates. Nearly 1,000,000 coal miners alone have completed the courses—920,309, to be exact—and the number trained in all the mineral industries totals 1,267,587. At 2,315 mineral plants every member has completed a Bureau course in safety instruction.

One phase of the Bureau's technologic work during the past year comprised comparative tests made by the coal-hydrogenation laboratory on various types of low-rank coals from the West. Owing to the demand for solid fuels of high grade, it has never been profitable to market some of these western coals. However, the reserves are of such prodigious size that, in spite of the relatively low recovery of liquid hydrocarbon from them, they offer a potential source of motor fuel and may permit fuels of higher grade to be reserved for services where quality is of importance. Moreover, manufacture of motor gasoline from this source would help to insure a continued supply of motor fuel if and when our petroleum output begins to decline.

As fuel consultant to the Government, the Bureau made numerous money-saving suggestions for the operation of heating equipment. One such suggestion reduced the cost of a proposed replacement over \$80,000.

A bulletin on metal-mining practice that promises to become a standard textbook in its field is in course of publication. It embodies the cumulative information contained in several hundred reports on mining and milling methods at representative operations and should prove a valuable handbook for metal-mining engineers and students.

The Bureau's two "experimental mines," the original Experimental Mine at Bruceton, Pa., and the Testing Adit at Mount Weather, Va., are proving to be valuable laboratories for testing mine equipment

and practice. Ventilation, drilling, blasting, and dust studies are conducted by three Bureau divisions working in cooperation at Mount Weather. At Bruceton demonstrations of the explosibility of coal dust and studies of strength of coal pillars are being continued.

The process for making electrolytic manganese, developed and patented by the Bureau, will be applied on a commercial scale in a plant utilizing electric energy supplied by facilities of the Tennessee Valley Authority.

Greater efficiency is being obtained with improved apparatus for precipitating solids from smelter smoke and fume by supersonic methods.

Progress is reported in a study of atmolysis (the unmixing of gases); in investigations of methods for producing pure sponge chromium from chromium chlorides; in advancing from a laboratory to a pilot-plant scale the process for desulfurizing blast-furnace iron by treatment with calcium carbide; in recovering gold from arsenical ore by a sulfatizing roast and cyanidation; and in devising a process for the manufacture of magnesium metal from magnesites.

Bureau of Mines petroleum engineers visited a number of representative oil fields to make determinations of gas escapement from wells with the Bureau's subsurface-temperature-recording gage. This apparatus locates the point at which gas escapes from a well, thereby allowing many millions of cubic feet of gas to be saved that otherwise would be dispersed under the surface.

The Bureau is studying well spacing, one of the important problems to be solved by the petroleum industry, especially in its conservation aspects. In several States, oil-field brines have been an agricultural hazard, killing livestock and vegetation and polluting the water supply. The Bureau has suggested methods of disposing of these brines and is extending its studies to other affected localities.

About one-sixth of the 6,000,000 cubic feet of helium produced by the Bureau's plant at Amarillo, Tex., during the fiscal year was purchased for non-Government use. Although the Army and Navy as usual bought the bulk of the output, the National Bureau of Standards used small quantities in research and the Weather Bureau contracted for delivery of about 750,000 cubic feet for inflating small balloons.

Electrothermal facilities afforded by acquisition of a laboratory in the Tennessee Valley Authority area of Tennessee have permitted tests to be conducted on the firing of sanitary wares made from American clays. It has been shown that the domestic commodity can replace English clays formerly used to the exclusion of clays obtainable in the United States.

Experiments on a variety of nonmetallics subject to beneficiation by flotation have proved that preliminary conditioning or "scrubbing"

of these minerals will result in pronounced improvement in the separation obtainable.

Preliminary tests are pointing to the utilization of coal refuse in a number of ways; these include application in water purifying, water softening, and soil conditioning.

A series of tests has been undertaken to determine the causes of ignition of firedamp by explosives. The emission of poisonous gases from explosives is proving one of the most important subjects being investigated at the Mount Weather Testing Adit.

Much work is involved in the testing of explosives for "permissibility." Explosives must not only pass the searching original tests to be adjudged "permissible," but must continue to pass them. About 2,000 gallery and other control tests were made in the course of the year.

The 1938 edition of Minerals Yearbook, numbering 9,000 copies, was exhausted before the end of the fiscal year. Final data for 47 chapters were prepared in time to permit publication before the bound volume went to press, so that about two-thirds of the material in the complete book was in the hands of interested persons several months earlier than usual. For the 1939 volume, 48 chapters were so prepared and distributed.

The Bureau of Mines editorial section now handles nearly 500 publications a year, including printed reports, mimeographed circulars, and papers prepared for technical conferences and scientific journals.

The Bureau has a film library comprising more than 2,200 sets of subjects, totaling over 2,000,000 feet of film. In 1939 attendance at showings of these industry-sponsored motion pictures was nearly 10,000,000.

FUTURE PROGRAM

Funds provided by the Third Deficiency Bill, signed by the President August 9, will enable the Bureau to begin the investigation of this country's resources of strategic minerals. It is proposed to study the occurrence of ores of these minerals to determine their tenor and to estimate mining costs so that, in an emergency, such information will be available.

Naturally, only a few localities can be surveyed with the funds provided, but these have been selected with care and plans for the reconnaissance have been painstakingly drawn.

The eight projects already started are: Investigation of antimony deposits, Valley County, Idaho; investigation of chromite deposits in Sweetgrass and Stillwater Counties, Mont., at Casper Mountain, Wyo., and near John Day, Oreg.; manganese deposits in the Olympic Peninsula, Wash.; tin deposits at Tinton, S. Dak., and in Catron

County, N. Mex.; and tungsten deposits in the Nightingale district, Nev.

Completion of the Intermountain Experiment Station at Salt Lake City will provide a greatly needed center for study of problems relating to nonferrous metallurgy. Adequate space is being supplied for the various types of laboratory equipment necessary for work actually under way or in contemplation. However, more extensive apparatus will be needed to carry development of processes through engineering-scale tests so that a more convincing picture of commercial possibilities can be offered for inspection by industrial firms.

The gigantic dam projects recently finished or nearing completion will bring tremendous supplies of electrical energy to regions abundant in minerals but lacking facilities for their preparation at low cost. One of the most interesting features of the Bureau's technologic work is to study these minerals, determine their characteristics, and endeavor to find new uses for them. Several promising opportunities for new domestic industries are thus being brought before the public. For example, the ceramics industry in the United States shows promise of becoming more self-sufficient in consequence of Bureau of Mines investigations in regions served by the Tennessee Valley Authority, Boulder Dam, and the soon-to-be-completed Grand Coulee Dam.

Results of the Bureau's investigations in the field of petroleum and natural-gas technology have been so cordially received by the industry that the Bureau's engineers are in great demand for study of problems applicable not only to the whole industry but also to individual districts and fields.

Transfer of the Bureau's foreign minerals specialist from England to Brazil, at the request of the Department of State, should make available a wealth of new information regarding the mineral industries of our neighbors to the south. However, withdrawal of the specialist from Europe deprives the Bureau of a first-hand view of events in the mineral industries of the Old World—a condition that should be remedied.

Considering the importance of the petroleum industry, it is unfortunate that the Bureau training courses in first aid could be extended to such a relatively small proportion of its personnel. Where training has been given, it has been received with enthusiasm and practiced so intelligently that a number of petroleum employees each year receive the honor awards of the Joseph A. Holmes Safety Association.

The Bureau of Mines is justly gratified that operators and miners cooperated so well in 1939 that not one major disaster occurred during the fiscal year. This excellent record, however, does not

mean that vigilance can be relaxed by the Bureau or the mining industries. New problems are constantly being brought into focus by changing technique and equipment.

REVIEW OF THE YEAR'S WORK

During the fiscal year 1939 the work of the Bureau of Mines was administered under the Technologic, Economics and Statistics, Health and Safety, and Administrative Branches from offices in Washington, but most of the activities were conducted in representative mining districts throughout the entire country. Fourteen experiment stations (at Bartlesville, Okla.; Berkeley, Calif.; Boulder City, Nev.; College Park, Md.; Laramie, Wyo.; Minneapolis, Minn.; Norris, Tenn.; Pittsburgh, Pa.; Reno, Nev.; Rolla, Mo.; Salt Lake City, Utah; Seattle, Wash.; Tucson, Ariz.; and Tuscaloosa, Ala.) studied problems connected with mining, utilization, and conservation of the Nation's mineral resources, a number of field offices handled special assignments, and the safety personnel moved on a flexible schedule, visiting mining establishments on request.

TECHNOLOGIC BRANCH

The Technologic Branch conducted engineering and scientific research in the interest of the mineral industries. It comprises six divisions—Coal, Mining, Metallurgical, Petroleum and Natural Gas, Nonmetal, and Explosives—and the office of the principal mineralogist. The branch also had charge of the cooperative program between the Bureau and corresponding Government organizations in several foreign countries.

Coal Division

The Coal Division tests all types of coal and investigates their composition, properties, and utilization not only as fuels but as raw material for the production of gas, coke, liquid fuels, and byproducts. In addition, the division acts as consultant in the purchase and use of fuels by the Government, a service that during the past year has been extended to serve the needs of the National Bituminous Coal Commission in obtaining and distributing comprehensive information concerning the analysis and physical properties of coal. These latter data bear an important relation to the fixing of minimum prices for the various classes of coal.

The survey of the gas-, coke-, and byproduct-making properties of American coals has been amplified to include a study of those that coke poorly; blending these coals with certain low-volatile coals improves the properties of the resulting coke. The Bureau's experimental coal-hydrogenation plant at Pittsburgh, Pa., has operated

almost continuously; it has been shown that the lower-rank coals, such as the lignites and subbituminous coals of the West, are amenable to conversion into liquid fuels and constitute an encouraging potential source of petroleum substitutes when the Nation's oil supply must be supplemented by motor fuels derived from coal.

Experimental coal mine.—Tests of small pillars of the Pittsburgh coal bed in the Experimental Mine, Bruceton, Pa., indicated that a cubical pillar had a crushing strength of 700 pounds per square inch. Studies of roof movement in other coal mines permitted mining methods and depth of cover to be correlated with subsidence of the surface, a matter of importance in connection with the construction and maintenance of permanent roads through mining areas.

Constitution of coal and miscellaneous analyses.—Carbonization tests have shown that resins in coal give high tar yields and that splint coal yields less gas than bright coal from the same bed. Hydrogenation studies of pure coal constituents indicate that opaque attritus is the principal constituent, other than fusain, responsible for low yields of oil and that splint coals are less suitable for liquefaction than bright coals.

Coal analyses and fuel inspection.—During the year, 10,097 samples of coal, coke, and related materials were analyzed in connection with Government purchases and studies of coal, an increase of 16.5 percent over last year. Three especially equipped trucks visited 380 mines in seven States and collected 1,524 samples, an increase of 100 percent.

Fuel-economy service.—Numerous power-plant studies, fuel-efficiency tests, and investigations on the selection of proper fuel for specific plants were made for various Government agencies. Recommended changes at one plant, costing about \$18,700, eliminated the need for a new turbine costing about \$100,000, thereby saving \$81,300. Under Bureau of Mines supervision, feed-water conditioning has increased at Federal boiler plants, resulting in improved fuel efficiency, lower maintenance cost, and greater safety. Frequent calls from municipalities for advice on smoke abatement were answered, and six publications were issued.

Combustion research.—Supplementing the Bureau's previous studies of overfeed (hand-fired) and underfeed burning in fuel beds, research has been undertaken on the third and remaining primary type—the crossfeed—in which the coal burns on traveling-grate stokers.

Carbonization of coal.—The survey of gas-, coke-, and byproduct-making properties of American coals was extended to three medium-volatile coals, two low-volatile coals, and one high-volatile-A coal.

Subbituminous coal and lignite.—A coal-carbonizing power plant of 40 kilowatts capacity is under construction, to test its suitability for the utilization of subbituminous coal. Fifty tons of lignite from four North Dakota mines were dried at the University of North Dakota by the Fleissner process. A fairly stable fuel satisfactory for domestic use was obtained.

The physical and chemical properties and low-temperature carbonization yields of 14 representative subbituminous coals from the Denver (Colo.) region were surveyed.

Tests at the Seattle Experiment Station showed that subbituminous coals and lignites may be burned for house heating at high efficiencies if an overfeed-type stoker is used.

Hydrogenation of coal.—The procedure developed by the Bureau last year for the hydrogenation assay of American coals was applied to five different ranks, ranging from an Alabama high-volatile-A bituminous coal to a North Dakota lignite. The yields of oil decreased with the rank of the coal, being 50 to 60 percent by weight for bituminous coals, 45 percent for a Colorado subbituminous coal, and 30 percent for a North Dakota lignite. The glossy, bright bands in coal known as anthraxylon or vitrain were found to liquefy completely, whereas the dull, splinty bands were only partly liquefied in the hydrogenation process.

Conclusions and recommendations.—Demands from numerous Government agencies and from the public for more comprehensive information on the properties and suitability of different American coals for various purposes are increasing at a more rapid rate than are the appropriations for coal testing and research. Conservation of the Nation's limited reserves of the liquid fuel petroleum and of natural gas calls for intensive study that will point the way to wise complementary utilization of our abundant coal resources, thus prolonging the years in which petroleum will be available for supplying gasoline and other automotive fuels at a reasonably low price. Provision also should be made for research on the mining, preparation, and utilization of anthracite to assist this ideal solid fuel to regain its proper status in supplying national energy needs.

Mining Division

The Mining Division attempts to adjust its program to changing needs and conditions within the industry. From 1928 to 1936, for example, efforts were directed mainly toward the investigation of various mining and milling methods as a basis for comparison with respect to their application and their influence on economy and safety of operation and conservation of resources. At present, emphasis is

being placed on original research designed to aid practical solution of mining problems. Of special importance is the progress made during the past year in devising scientific methods for measuring pressures on rock pillars and for predicting their failure. Other outstanding work has included investigations of dust control and noxious gases from blasting, studies of seismic effects of blasting on artificial structures, ventilation of the mine face, and reclamation of stripped coal lands.

Metal mining and milling methods.—Detailed field investigations of metal mining and milling methods and costs continued in nine Western States, together with field service in the form of technical assistance to prospectors and small-scale operators.

Metal-mining research.—Encouraging progress was made on two principal problems—determination of pressures on rock columns by sonic methods and the use of stemming in blasting.

New technique was developed for the sonic method of determining the elastic constants of rocks in the laboratory, and application of the principles to measurement of loads on rock pillars was begun in mines of three districts. The large variation in velocity of sound with pressure found in the various rocks tested justifies use of the sonic method for this purpose. New field apparatus was designed, built, and tested. Some rocks receive a permanent set after heavy loading that reduces their elasticity by amounts that are measurable by the methods developed; application of this principle to mining problems requires additional study.

The Mount Weather (Va.) Testing Adit, now equipped for conducting various types of investigations, provided a useful mine-scale laboratory. Stemming tests comprised measurements of drilling speed, dust counts, and sampling of gases produced in drilling and blasting 53 standard rounds; only tentative major conclusions are yet possible. Data were procured on increased speed in drilling with reduction of bit gage; on comparative speed in drilling with anvil-block and standard drifters; on alloy-steel and hard-surfaced bits; and on methods of ventilating the face of mine workings.

Nonmetal mining.—Studies of drilling, blasting, loading, and transportation in quarries continued, and one progress report was completed. A summary report on results of earlier extensive investigations of primary crushing was published.

The manufacture of mineral wool was studied and a report on this subject published. Two reports were issued and two office memoranda completed on observations of seismic vibrations from blasting and on mechanically induced vibrations in buildings. Tests were made on the seismic effects of explosives having different physical charac-

teristics; on the destructive effects of blasting on frame structures; on calculated time delays between two blasts as a means of reducing the amplitude of resultant vibrations; and on the destructive effects of mechanical vibrations on frame structures.

Coal mining.—Various phases of coal-mining practice are investigated to ascertain trends and reach conclusions that will aid in promoting efficiency, safety, and conservation. Last year studies were made and reports issued as indicated by the following titles: Truck vs. Rail Haulage in Bituminous-Coal Strip Mines, Reclamation of Stripped Coal Lands, and Multiple-Shift Mechanical Mining.

Mine ventilation.—Investigations were made of mine and tunnel ventilation, of recent mine fires, and of air conditioning as applied to metal mines. Original research was conducted throughout the year at the Mount Weather Testing Adit on the face ventilation of tunnels and development headings.

Mineral-industries survey.—This survey involves investigations of the mining industry in separate districts or counties as a basis for reports giving authentic, pertinent information regarding past and current activities, operating costs, and local factors that affect them and calling attention to the potentialities of the areas studied. In addition to the four circulars of the mineral industries survey series already mentioned, one bulletin on mining in Calaveras County, Calif., was published during the past year, one on Tuolumne and Mariposa Counties was completed and in press, and district surveys were made in California, Nevada, Idaho, South Dakota, and Colorado.

Electricity and machinery.—More than 700 persons witnessed demonstrations of electrical ignition of gas-air mixtures, made to impress on the mining public the hazards of faulty electrical equipment and improper installation. Facilities were added for conducting tests for the Navy Department; two galleries were designed and constructed for making explosion tests of electrical equipment intended for use on ships where gasoline vapors may be present. Mechanical and explosion tests were made on nine pieces of electrical apparatus, such as lighting fixtures, limit switches, and push-button stations. Cooperation with the Navy Department was extended further by training an assigned navy metallurgist in the use of an explosion gallery for studying the possible ignition of gasoline vapors and of "dope" solvents by abrasive sparks from various metals.

Conclusions.—Investigations of the types now active should be continued but should be varied, as in the past, to adapt them to changing conditions and needs. Coal-mining investigations ought to be expanded, and the encouraging results already obtained from research on measurement of rock pressures warrant increased aggressiveness in applying it to other mining problems.

Metallurgical Division

The Metallurgical Division has made important contributions toward conserving domestic mineral resources through wise, efficient use. The investigations include: Determination of fundamental data on metallurgically important materials; improvement of standard ore-treatment methods to eliminate waste and improve the grade or recovery of products; and development of new metallurgical processes.

Among outstanding accomplishments may be listed the completion of investigations that have demonstrated the practicability of a new process for unmixing gases and a novel technique for the production of pure sponge chromium; cooperation in the establishment of a commercial plant for the production of electrolytic manganese; the development of procedures for the recovery of nickel, antimony, chromium, and gold from their ores; improvements in ore-dressing methods and in the desulfurization of iron; study of new apparatus and methods of analysis; and the development of apparatus for precipitation of dust and fume.

Metallurgical fundamentals.—The importance of determining and interpreting fundamental properties of metallurgically important minerals is becoming more widely recognized. Among the projects that may be listed under this heading, the experimental measurement of specific heats at low temperatures has been continued at a high degree of productivity; 13 materials were investigated during the year.

Refined methods of determining heats of solution, especially adapted to particular metallurgical problems, have been developed. They will be exceedingly useful in the study of silicates and slags. Comprehensive data on the hydrates of calcium sulfate have been obtained by this method.

A bulletin presenting the first inclusive treatise on technical atmolysis (the separation of mixed gases of unequal diffusibility by transmission through porous substances) has been virtually completed. It will provide a basis for commercial application in many fields of the process developed in the Metallurgical Division for unmixing gases.

Laboratory investigations of methods of producing pure sponge chromium from chromium chlorides have been completed; a bulletin on the thermodynamic properties of chromium compounds and their application to the reduction of chromium is in preparation.

Metallurgy of steel.—The coercimeter developed for rapid determination of carbon in plain carbon steels has proved quite suitable for the class of steel fabricated in most plants. A new method of determining carbon from measurements depending on the saturation value of the sample has been developed for high-carbon steels.

Blast-furnace studies.—The process for desulfurizing blast-furnace iron and cupola iron by treatment with calcium carbide was advanced from a laboratory to a pilot-plant scale.

Special studies.—A generator of sonic and ultrasonic waves has been built that is believed to be more efficient in flocculating fumes than any other device now available. High-frequency electrical methods have been devised in connection with research on metals and alloys.

Ore dressing.—Accomplishments of especial interest in the field of ore dressing include: The solving of a grinding problem by the use of wetting agents; the determination of optimum conditions for separating ores by suspensions that simulate heavy liquids; extension of the use of cationic agents to the flotation of ores not previously investigated; and determination and elimination of factors that prevented satisfactory flotation of various ores.

Pilot-plant and semicommercial-plant tests confirmed the findings of laboratory investigations. A 250-ton flotation plant for the treatment of a lead-zinc-fluorspar ore has been built, and a 100-ton flotation plant for the treatment of fluorspar tailings is being constructed as a consequence of these tests.

Precious metals.—A process developed for recovering gold from arsenical ore by a sulfatizing roast and cyanidation has proved its value since adoption by gold-recovery plants.

The study of new methods of analyzing ores has provided important improvements in determining several elements.

Nonferrous metallurgy.—A regulated roast has been devised to oxidize certain sulfide minerals superficially and thus provide for their separation by flotation. Conditions have been established in sintering lead products by which enriched sulfur dioxide gas is produced. Improved gold recovery has resulted from application of the knowledge derived from determination of the association of gold previously lost.

Copper metallurgy.—Work was continued on flotation of oxidized copper ores and on production of metallic titanium.

Electrometallurgy.—An outstanding phase of the electrometallurgical work is cooperation in establishment of a commercial plant at Knoxville, Tenn., for production of electrolytic manganese by the process developed by the Metallurgical Division.

A method has been developed for the recovery of nickel, copper, and platinum metals from domestic nickel ores, and results of the preliminary work are being prepared for publication.

Technique has been devised for the electrolytic recovery of antimony and gold from antimonial gold ores.

The recovery of potash and alumina from alunite has been worked out on a laboratory scale.

Notable achievements have been attained in devising a process for the manufacture of magnesium metal from magnesites.

Other electrometallurgical work is concerned with the recovery of metallic chromium and chromates from domestic ores, the treatment of vanadium ores, the production of calcium boride, metallic boron,

and boron alloys from colemanite, and the development of electric furnaces for smelting nonferrous ores.

Conclusions and recommendations.—The success achieved in inducing private interests to produce electrolytic manganese by the method devised in the Metallurgical Division has shown the value of carrying work through the laboratory stage to the solution of engineering problems. Some progress has been made in equipping the laboratories of the division so that this can be done, but there is still need for larger-scale apparatus and adequate funds to operate it.

Perhaps the greatest hindrance to effective operation of the division would be overcome by provision of a machine shop so well stocked that special instruments and apparatus can be promptly and properly constructed. Allowance for ample space has been made at the new Salt Lake City station, but funds for the purchase of machine tools and for large-scale equipment are not available.

Petroleum and Natural-Gas Division

Steady and persistent advance in hitherto unexplored fields of petroleum and natural-gas technology marked the activities of the Petroleum and Natural-Gas Division. The major benefits of the year's work will be revealed in the future, as gradual development along well-considered lines is required to show the true value of most new ideas. For example, only recently has there been general acceptance of the practice suggested by Bureau engineers some years ago of gaging the capacity of gas wells without wastefully "open-flowing" them to the air.

Production of petroleum and natural gas.—Work on the coordinated group of problems incident to the petroleum and natural-gas industry emphasized factors that influence the behavior of natural petroleum reservoirs. Casual observations at the surface often fail to reveal whether material coming from deep, high-pressure wells is liquid or gas at the pressures and temperatures in the natural reservoirs. Field tests and laboratory investigations with specially built apparatus gave data on the effects of retrograde condensation, which influences the behavior of many wells that produce large quantities of gas and relatively small quantities of liquid hydrocarbon. The Bureau's subsurface-temperature-recording gage was used to determine the position of gas escapement from wells, thus saving many millions of cubic feet of gas that otherwise would be lost underground.

Studies were continued on well spacing, judged to be one of the most important problems to be solved by the industry. The Cutler rule of well spacing was reviewed further in its application to present-day operations, and initial tests were made with the Bureau

of Mines-American Gas Association coring device, designed to obtain samples of uncontaminated reservoir rocks and their contents.

Other activities included a report on the study of flow of air and natural gas through porous rocks. Experimental work on the effects of edge-water encroachment was extended, and initial laboratory experiments were made upon the compaction of porous sandstone rocks. The effects of acid treatment on limestone formations in Kansas were reported, and new research on methods of cleaning wells was begun. The problem of penetrating deep-lying formations that expand into the well bore was attacked in the field by analyzing case histories of heaving-shale wells, and drilling fluids were studied to determine their behavior under imposed laboratory conditions.

Safety in the petroleum industry.—Records of 2,600 accidents in the Oklahoma petroleum industry during the calendar year 1937 were analyzed. Tests were made to determine the extent of hazards in petroleum laboratories owing to mercury vapors.

Natural gas.—A report was issued on the catalytic hydrogenation of tars obtained from pyrolysis of natural gas. In cooperation with the American Gas Association, additional reports were made on freezing in natural-gas pipe lines caused by formation of gas hydrates. At pressures exceeding 1,000 pounds per square inch, hydrates may form at temperatures above 60° F. The Bureau has designed a simplified apparatus suitable for determining compressibility of gas at pressures usual in industrial work.

Engineering field studies.—Supplementing work on fields of the Balcones fault-line system of Texas, decline curves and the relation between well spacing and recovery under conditions of restricted production were checked and compared with data developed for the most part under controlled conditions in the Rodessa (Louisiana, Texas, and Arkansas) and Anahuac (Texas) fields. A report was made on the reservoir characteristics of the Eunice (New Mexico) field, where an improved method of estimating oil and gas reserves in limestone fields is being developed that notes pressure drops and corresponding withdrawals of reservoir material at different time intervals.

Oil-field brines.—Cooperative reports describe typical oil-field brine-conditioning systems in Kansas and Oklahoma, and general assistance was given to other States concerned with the problem.

Storage, refining, and utilization of petroleum.—The survey of crude oil in storage for the year 1936-37 was reported, and two additions were made to the series of semiannual gasoline surveys, by cities, assisted by the Cooperative Fuel Research Committee. An information circular on ichthyol and a bulletin discussing properties of oil shale and shale oil were published. Continuing the series of crude-

oil analyses, a report was issued on oils from fields of Oklahoma, and manuscripts were completed on Arkansas and northern Louisiana crude oils. Work on the chemistry and refining of Wyoming black oils dealt particularly with crude oils from the Oregon Basin, Dallas, Derby, and Garland fields. The investigation also included chemical treatment of the cracked distillates. The study of asphalts centered around those prepared from Oregon Basin (Wyoming) crude oil. Changes in consistency with changes in temperature were compared with published values for asphalts obtained from other crude oils.

Helium production.—The Amarillo (Texas) plant produced 6,301,000 cubic feet of helium during the fiscal year. The Army and Navy purchased 72 percent, the National Bureau of Standards received shipments for research, and the Bureau of Entomology, Geological Survey, and Weather Bureau used the remainder diverted to Government use for inflating small balloons. The Weather Bureau alone was supplied with 743,745 cubic feet during the first 11 months of the fiscal year. The amendatory Helium Act, approved September 1, 1937, authorized the Bureau to sell helium for medical, scientific, and commercial use under regulations approved by the President. During the first 11 months of the year approximately 1,022,000 cubic feet of helium was delivered for non-Government use, mainly for lighter-than-air craft and for treatment of respiratory diseases. Deliveries for non-Government use increased more than fourteenfold over those of the previous year.

Conclusions and recommendations.—The whole-hearted cooperation of the industry with the division, in supplying technical data and other assistance, increased the effectiveness of its work tremendously. However, the \$260,000 Federal appropriation for oil and gas studies, augmented by approximately \$60,000 in cooperative funds supplied by States and other agencies, is indeed small in comparison with the needs for technical research pertaining to conservation of petroleum resources.

Nonmetals Division

In general, the work of the Nonmetals Division is concerned with the dressing of nonmetallic minerals, including salts and waters, and utilization of the products therefrom. Investigations of the division are now carried on at Bureau of Mines experiment stations at College Park, Md.; Tuscaloosa, Ala.; Seattle, Wash.; and Norris, Tenn. The last was acquired during the past year by arrangement with the Tennessee Valley Authority and is occupied with electrothermal research, using power generated by the T. V. A. and raw materials from the region.

Electrically heated ceramic kilns.—At Norris, many ceramic tests have been made in periodic electric furnaces and, more recently, in a twin-tunnel, continuous electric kiln.

Kyanite refractories.—Extremely fine concentrates of North Carolina kyanite purified by flotation were made into dense mullite refractories resistant to lead at 1,450° C. The results indicate the possibility of more extensive replacement of Indian lump kyanite by the southern mineral. Attempts are being made to improve the grade and recovery of kyanite from schists.

Coal.—Work on coal washing is done at Tuscaloosa and Seattle. Much practical information has been procured regarding the problem of handling slurry at Alabama and Washington coal washers. The drainage and dewatering of washed coal are being studied in Alabama, and the flocculating action of wheat flour and of potato starch for clarifying circulating washery water was compared at the Washington station.

Preliminary experiments have found uses for coal-mine refuse as an activated char for water purification, as a base exchanger in water softening, and as a soil conditioner in agriculture. An examination of pulverizers and powdered coal at power and metallurgical plants is in progress, and a new type of laboratory grindability machine has been developed.

Scrubbing mineral surfaces before flotation.—The surfaces of minerals are naturally contaminated. When these are difficult to float, experimenters spend much time seeking new flotation reagents to give more selective filming. Actually, the trouble is due rather to impurities that either mask the true mineral surface or serve as activators on the surface of minerals that are not to be floated. The desired minerals should be conditioned before floating, and an "attrition scrubber" has been developed that has proved suitable for such minerals as diatomite-clay, spodumene, mica, vermiculite, glass sand, and earthy stuff. The improvement in many flotation separations is so pronounced that this development is regarded as one of the outstanding achievements of the year.

Optical investigations.—The College Park and Tuscaloosa stations both have petrographic and spectrographic laboratories, and the former an X-ray laboratory as well, for the examination of minerals. Various problems in the field of optics are being studied at both stations.

Mineral separation by heavy suspensions.—The addition of some fine, heavy mineral to water, making the pulp denser than that of the ore being dressed, permits separation of the minerals from the gangue; this phase of mineral dressing is receiving attention.

Oil-drilling muds.—For the study of oil-well-drilling muds a device tentatively called the "eykometer" was developed to measure the yield-point of a mud immediately after agitation and after an elapsed time.

Boiler water and boiler steel.—For this continued investigation an embrittlement detector was developed to create test conditions that approach more closely those in a riveted boiler seam. Protective agents against crystalline cracking were thoroughly studied. A colorimetric determination of organic matter in boiler waters was adapted.

Slate concrete and silica brick.—Additional work was done on the possible use of waste quarry and mill slate as a raw material for lightweight aggregate, as well as on the use of opaline silica from diatomite deposits as raw material for silica brick.

Olivine refractories. At Seattle, work on uses for olivine was concerned mainly with the manufacture and testing of full-size refractories.

Diatomites.—Most of the reported deposits of diatomite in the State of Washington were sampled, and tests run on them to develop filter aids gave encouraging results.

Air or pneumatic elutriation.—The Roller apparatus has received study to adapt it to making subsieve-size (finer than 200-mesh) analyses of many materials that have hitherto been difficult to size accurately by this instrument.

Explosives Division

The Explosives Division conducts research and tests on the explosibility of gases and vapors and on the properties and reactions of commercial explosives with special reference to their suitability in metal mining and tunneling and their permissibility for use in coal mines.

Testing of explosives.—Seventeen explosives and two blasting devices were tested to determine their permissibility for use in coal mines. Only one explosive failed to pass the required tests. In all, 683 gallery tests and 1,309 other control tests were made at the Explosives Testing Station, Bruceton, Pa., and 131 chemical analyses were completed in the Explosives Chemical Laboratory, Pittsburgh, Pa.

Mechanism of ignition of firedamp by explosives.—An extended experimental study to determine and so move to eliminate the underlying causes of the ignition of firedamp by explosives indicates that incandive particles alone probably are not responsible. The inquiry is being continued to determine the importance of the shock wave and of the hot gases and flame.

Poisonous gases from explosives.—Studies to correlate field results with laboratory findings and to develop the fundamental factors influencing the emission of poisonous gases from explosives have shown the importance of the detonator, the conditions of confinement, and the weight of the explosive charge.

Gas explosions.—To assist in preventing deaths from the explosion of combustible anesthetic gases in hospital operating rooms, a report was published stating the conditions and causes to be eliminated. Additional studies were made of the amount of inert gases necessary to render combustible gases (including anesthetic gases) nonexplosive, and the oxygen concentrations below which these combustibles are incapable of propagating flames were determined.

Experiments on the elimination of explosion hazards in underground spaces and in battery rooms were continued, and fires and explosions in underground conduits, hospitals, a school, and coal in storage were investigated.

Mine fires.—The laboratory investigation of the causes, behavior, and control of anthracite mine fires was continued. A method depending on analysis of the coal alone was developed for estimating the amount of heating that had taken place in stored anthracite. Experiments showed that depletion of oxygen in a mine atmosphere is no indication of the amount of heating that may have occurred.

Recommendations were made for minimizing the possibility of fires in refuse banks.

Hazards in the use of Diesel mine locomotives.—In cooperation with the Health and Safety Branch, the composition of exhaust gases from two types of four-stroke-cycle Diesel engines was determined to evaluate the health hazard. Additional experiments will be made on devices for preventing the initiation of explosions by flames and sparks from the engine.

Conclusions and recommendations.—The division needs increased appropriations to enlarge its staff and thereby permit it to comply with the many requests being made by State mine inspectors, mine operators, and manufacturers of explosives for investigation of the safety and suitability of new explosives.

Principal Mineralogist

During the year the principal mineralogist answered more than 1,500 letters; examined and identified several thousand specimens; and gave information to many visitors concerning minerals, their associations, and possibilities of profitable exploitation. A report of investigations on lithium was published. Field studies were made of certain strategic minerals and of the dunite-chromite deposits in the Southern States.

ECONOMICS AND STATISTICS BRANCH

The Economics and Statistics Branch assembled, reviewed, and published data on the production and consumption of all principal mineral commodities; prepared reports giving the results of special economic studies; and compiled the annual publication, *Minerals*

Yearbook. The branch comprised the Coal Economics, Petroleum Economics, Mineral Production and Economics, Metal Economics, Nonmetal Economics, and Foreign Minerals Divisions.

Coal Economics Division

Statistical services to the solid-mineral-fuel industries continued during the past fiscal year.

Annual reports.—Annual reviews based on canvasses of all known individual producers of Pennsylvania anthracite, anthracite and semianthracite outside of Pennsylvania, lignite, byproduct and beehive coke, fuel briquets and packaged fuel, and peat were incorporated in chapters for Minerals Yearbooks, 1939.

Monthly reports.—A mimeographed sheet was issued on the fifth of each month, carrying preliminary estimates of the production of Pennsylvania anthracite and of beehive coke for the preceding month. A report listing current production, stocks, shipments, and prices of the byproduct- and beehive-coke industry is distributed the latter part of each month. The January issue always contains three additional pages of preliminary statistics concerning the industry for the preceding year.

A third monthly publication, *International Coal Trade*, is in great demand among producers of both hard and soft coals, because of the decreasing domestic markets for coal, which have made it necessary to search out every possible outlet for our output. Original articles of timely interest included: *The Fuel and Power Situation in South America* (July 1938); *Fuel and Power in Czechoslovakia* (August 1938); *Germany's Position as a Coal Producer* (October 1938); *Fuel and Power in Turkey*, and *The Import Coal Trade and General Foreign Trade of Argentina, Brazil, and Uruguay* (April 1939); and *Coal Marketing in Great Britain under the 1930 Coal Mines Act* (items in several issues under the section "Coal Marketing Abroad)."

Weekly reports.—A combined report, with production graph, stating the estimated current weekly output of Pennsylvania anthracite and of beehive coke was published regularly throughout the year. This report includes a summary of developments in the Pennsylvania anthracite industry each month.

Correspondence and inquiries.—This phase of the division's work is of major importance, since it provides direct contact with the industries that the division is endeavoring to serve. The inquiries received—whether by telephone, mail, or personal visit—are a valuable aid in determining the needs of the solid-fuel industries and a service guide to the division.

Value of present statistical services.—The aggregate sales realization, at the plant, of the solid-mineral-fuel industries (exclusive of

bituminous coal) in even a subnormal year such as 1938 amounts to more than \$500,000,000. Needless to say, such large, complex industries require reliable, unbiased figures for future planning, which of necessity must be based upon the record of the present and its relation to the past. The statistical services of the Coal Economics Division fill these needs insofar as funds and personnel available will permit, and the published reports are in great demand among the public the division serves.

Conclusions and recommendations.—No special economic studies were made during the fiscal year 1939. The field for economic study is open in nearly every solid-mineral-fuel industry, especially in the Pennsylvania anthracite field, which is in a chaotic state of transformation where clear thinking is greatly needed, and in the United States coal-export trade, which is largely at the mercy of foreign national policies that bear little relationship to economic laws.

However, unless a portion, at least, of the funds lost to the division in 1937 is restored, no greater amount of work can be undertaken than is now being done.

Petroleum Economics Division

The Petroleum Economics Division collected statistics and assembled economic data on domestic and foreign production and consumption of petroleum, natural gas, and their products; prepared annual, monthly, and weekly reports; and compiled special reports on these subjects for Federal and State agencies.

Forecasts of demand.—Monthly forecasts of national demand for motor fuel and for crude petroleum, by States, have been prepared and issued by the division during the past 4 years. This work is of primary interest to the various State conservation agencies as basic information necessary for production programs to avoid waste and unnecessary storage of crude petroleum and its products. Collection of additional data and improvements in methods used have increased the accuracy of these forecasts.

International studies.—A monthly review of the trends of oil production and consumption in foreign countries was issued regularly. A special report dealing with refining and exports of the Netherland West Indies was prepared as the second of a series to cover the more important features of the world petroleum industry.

Special studies.—The first survey of kerosene consumption by States was completed during the year and represented further progress in the development of essential information relating to interstate movements and consumption of petroleum products by uses. Data covering monthly operations, by districts, for the past 4 years were

compiled for publication, and an economic study of the factors influencing motor-fuel demand was completed.

Mineral Production and Economics Division

The Mineral Production and Economics Division continued to collect mine-production statistics for gold, silver, copper, lead, and zinc in the United States; supervised the preparation of the annual volume—*Minerals Yearbook*; collected and interpreted statistics on employment, accidents, and explosives as related to mining; and, in cooperation with the Works Progress Administration, carried forward the study of changes in mineral technology with regard to their effect on output per man.

Metal-mine statistics.—Preliminary reviews of metal mining in the 13 Western States that produced nonferrous metals in 1938 were issued. These were followed closely by recapitulations summarizing mine production of gold, silver, copper, lead, and zinc. For the first time in the history of the work, final detailed statistics for all metal-mining States were completed by the end of June. Progress was made during the year on compilation of the historical record of metal mining in the Western States.

Minerals Yearbook.—*Minerals Yearbook*, 1938, was issued in August 1938. The total circulation of this volume exceeded 9,000 copies, and the sales edition was exhausted several weeks before the close of the fiscal year. This was especially gratifying, because 47 chapters had been separately preprinted, and it was feared that this advance distribution might reduce the sales of the bound volume.

Minerals Yearbook, 1939, included, in addition to its regular features, a review of the bituminous-coal industry contributed by the National Bituminous Coal Commission; a new chapter on Scrap Iron and Steel, prepared by the recently created secondary metals section of the Bureau; special tabulations of historical data on strategic minerals; and, for the first time in the *Yearbook* series, final data on metal mining in Arizona for the year under review.

Employment and accidents.—For the purpose of supplying mining companies and safety engineers with uniform, comparable data revealing the number and causes of accidents, the division continued its annual statistical surveys of accidents and the number of men employed at mines, quarries, and related operations.

Accident-prevention contests were conducted and safety trophies awarded to mining companies that established the most outstanding safety records, as determined by a statistical analysis of reports of accidents and man-hours of exposure to mining hazards submitted by the competing companies.

The annual statistical survey of the production of explosives in the United States was made, based upon reports from manufacturing

companies and showing the quantity of explosives used for mining and for other industrial purposes.

Changes in mineral technology and output per man.—In cooperation with the Works Progress Administration, the division continued the study of technologic changes and output per man in selected mineral industries in the United States. Reports on crushed stone, phosphate rock, grade of ore, and fuel efficiency in cement manufacture were published during the year, bringing the total of completed reports resulting from this cooperative program to seven. Three reports were being printed at the end of the year, dealing with oil and natural gas, bituminous-coal mechanization, and gold placers. Others nearing completion cover iron ore, copper, gypsum, lead and zinc, anthracite, and progress in rock drilling.

Conclusions and recommendations.—Moderate expansion of the division is needed to permit compilation of the complete record of metal mining by districts and individual mines; to expand the work on accident statistics, so that the petroleum industry may be included and the data now collected more thoroughly analyzed; and to undertake studies of economic problems of the mining industry similar to the investigations carried on in cooperation with the Works Progress Administration.

Metal Economics Division

Of unusual interest during the fiscal year 1939 was the work by the Metal Economics Division in the field of strategic minerals. The head of the division served as a member of the Mineral Advisory Committee to the Army and Navy Munitions Board, and three other specialists served on five commodity subcommittees investigating the national defense aspects of mineral supply. These assignments involved preparation of extensive reports on various phases of the deficient minerals problem for confidential use of the military branches of the Government. In addition, the division prepared several special reports and answered a greatly increased number of requests for authoritative information on strategic minerals from the Congress, other Government agencies, industry, and the public.

Secondary metals.—The establishment of a secondary metals section at Pittsburgh to serve the waste-material trade was necessitated by the importance of scrap as a source of metal supply and the demand for more detailed information on this industry. The section now numbers four members, and besides completing the canvass on consumption of scrap iron and steel in record time has made much progress in expanding the work on nonferrous-metal scrap. An extensive field investigation is under way to determine the needs of the industry in order that the Bureau of Mines may give the maximum service to the scrap-metal trade.

Other services.—During the fiscal year 1939, the division conducted statistical canvasses, prepared 74 manuscripts for publication, and answered nearly 3,000 requests for information.

Conclusions and recommendations.—The past year's activity demonstrated the necessity for collecting statistics on the marketing aspects of the metal industries. In connection with plans for industrial mobilization the War and Navy Departments have called upon committees of experts for advice on raw-material problems, and this work was handicapped by lack of detailed information on the uses of minerals. It is unfortunate that annual records on the consumption of such important strategic metals as manganese, chromite, tungsten, mercury, and antimony are not available. Data of this type are essential in considering problems of national interest and would be exceedingly useful to industry. There is also need for current data on stocks of metal on hand in consumers' plants. At present adequate statistics are available on production, shipments, and producers' stocks of the more important metals, but reliable records of actual consumption and the balance of supply and demand are not available because of the lack of information on consumers' inventories. These deficiencies could be supplied by a small addition to the staff.

Nonmetal Economics Division

Strategic minerals.—After making comprehensive preliminary reports on abrasives, asbestos, graphite, iodine, magnesite, phosphates, potash, quartz crystals, refractories, titanium, zirconium, and sundry other mineral commodities of potential military importance, specialists of the division served as members of the Mineral Advisory Committee to the Army and Navy Munitions Board and assisted in the preparation of confidential reports on abrasive diamonds, graphite, and mica.

Publications.—A general survey of gypsum and gypsum products was issued as an information circular, and two more units of a series of information circulars on marketing were published, covering salt and talc, respectively.

Conclusions and recommendations.—Despite the growing importance of the nonmetallic mineral industries and the many opportunities for Government aid in finding, interpreting, and disseminating the economic facts that indicate the progress and problems of these industries, no provision has been made for keeping pace with the increasing need for service in this field. In addition to handling about 21,000 questionnaires, the division now responds annually to approximately 5,000 inquiries from the public and more than 30 Government agencies, for it is still the main repository of information on these industries. Additional travel funds are needed to provide opportunities for field work to supplement past experience and training of the staff, and more personnel is another necessity for properly checking their work.

Foreign Minerals Division

The principal function of the Foreign Minerals Division is to collect, compile, and distribute economic information on the mining industries of foreign countries.

Foreign Minerals Quarterly.—During the fiscal year comprehensive surveys of mineral production and trade of Belgium and its colonies, France and its colonies, Denmark, Finland, Norway, and Sweden were published.

Economic Paper 19, The Iron and Steel Industries of Europe, containing the latest available statistical data on reserves, production, consumption, and foreign trade in iron ore, ferro-alloying ore, pig iron, primary steel products, and coal in European industrial countries, was issued.

Foreign minerals specialist.—After completing the survey of European iron and steel industries, and at the special request of the State Department, the Bureau's foreign minerals specialist transferred his headquarters from London to La Paz, Bolivia. During the fiscal year 1940 he will conduct studies of the mineral resources, production, and trade of several South American countries. This work is part of the Government's program for promotion of friendly Inter-American relations.

Consular reporting service.—During the fiscal year 2,056 reports on various phases of mineral economics were received by the Bureau from the Foreign Service of the State Department.

HEALTH AND SAFETY BRANCH

The Health and Safety Branch, consisting of the Health Division and the Safety Division, conducted safety training courses, answered emergency calls for aid after catastrophes at mines and mineral plants, and studied conditions that affect the health of workers in the mineral industries.

Health Division

The Health Division continued its investigations of the effect of the working environment on the health of employees in the mineral industries. Much valuable information on sources, effects, and control of atmospheric contaminants was obtained and disseminated.

Gas analysis.—About 2,700 gas samples were analyzed during the year, an increase of 40 percent over the past fiscal year. Approximately 1,200 of the samples were from mines and tunnels, in connection with ventilation surveys, studies of mine explosions, control and extinguishing of mine fires, use of explosives underground, and promotion of safe and hygienic working conditions in and around mines.

The other samples were analyzed in connection with research on Diesel exhaust gas, compressed-air illness, and other special investigations.

Compressed-air illness.—A study of compressed-air illness in cooperation with the United States Public Health Service and the Port of New York Authority was completed. The results showed that administration of oxygen increased elimination of nitrogen from body tissues and fluids. Practical application of this information indicated that the administration of oxygen could be utilized in preventing compressed-air illness among tunnel workers. Valuable data and experience were gained that should be helpful in combatting hazardous conditions incident to work in compressed air.

Diesel exhaust gas.—The laboratory study of the composition of Diesel-engine exhaust gas was continued. The results of the past year have contributed materially to better understanding of the problems involved in the use of Diesel engines in underground operations.

Respiratory protective devices.—The Bureau's approval of respirators has been of incalculable value in the development and promotion of proper use of safe and satisfactory devices. As evidence of the value placed on the Bureau's approval, many organizations require that none but approved devices be purchased for use by their personnel. Eighteen approvals were granted during the year, an increase of 50 percent over the past fiscal year and more than 200 percent greater than in any other year.

Dust studies.—Work has been continued on investigations of the characteristics of various methods used for determining concentration, composition, and size properties of dusts. Notable progress has been made in utilization of X-ray, spectrographic, and petrographic methods in determining the composition of air-borne dust. Data obtained during approval testing of respirators have been of value in understanding the fundamental characteristics of air-borne dust.

Safety Division

Personnel.—During the fiscal year 1939 the Safety Division staff comprised 82 members—30 engineers, 29 safety instructors, 17 clerks, and 6 other employees. They were distributed as evenly as possible among the various mining States, and were headquartered at 17 cities.

Training courses.—In the past 12 months the Safety Division gave complete Bureau of Mines training courses in first aid and mine rescue to 120,733 persons in the mining and allied industries in 937 communities in 41 States compared with 105,093 persons trained in

1937 and 69,662 in 1936. The number trained in the past fiscal year is the largest in the history of the work. Since the Bureau was organized in 1910, full training courses in first aid and mine rescue have been given to persons in the mining and allied industries as follows: Coal mining, 920,309; metal mining, 140,641; petroleum industry, 99,513; metallurgical plants, 32,946; nonmetallic mining, 18,831; cement plants, 14,096; tunnel work, 6,543; and miscellaneous mining activities, 34,708—a total of 1,267,587. It is estimated that as a result of this phase of Safety Division work alone at least 200 lives are saved annually.

Mine fires and explosions.—In the entire fiscal year there was not one major explosion or fire disaster in any mine in the United States; 1939 was the first year in the history of the Bureau to have attained such a record. A major disaster is one in which five or more lives are lost. This achievement of the American mining industry is a remarkable one, especially when compared to the annual average of 17 major disasters and 562 fatalities in the 4 years that preceded establishment of the Bureau.

In the course of the year 14 mine explosions in 8 States and 20 mine fires in 14 States were investigated, and the Bureau's personnel aided in rescue and recovery work at virtually all where life was involved.

Without doubt, much of the relative immunity from mine fire and explosion disasters now enjoyed in the United States is due to various phases of safety work promoted by the Bureau. One of the most outstanding is its advocacy of rock dusting, a practice known to prevent the propagation of many widespread explosions every year, with attendant fatalities. It is believed that for the past decade rock dusting alone has forestalled several hundred fatalities annually in coal mines of the United States.

Fifty-nine miscellaneous accidents in 23 States (including those from roof falls, explosives, electricity, and other causes) and numerous surface explosions of black powder, dynamite, pulverized fuel, and gas were investigated.

Mine reports.—Two hundred and sixty-one reports were made during the year on safety conditions at individual mines or plants in the mineral industries of 31 States; some of these were transmitted confidentially to the operating company, with constructive criticism of existing conditions and definite recommendations for improvement. These reports, together with verbal suggestions by Bureau men during or after the inspections on which the reports were based, resulted in hundreds of important alterations in operating conditions (equipment, methods, and practices), with resultant favorable influence on the prevention of accidents. Large numbers of these changes have

been reported by field men, and several hundred letters from mining people voicing appreciation of this and other services were received during the year.

Other activities.—During the past year, 2,514 persons in 31 States were qualified to teach first-aid courses and given provisional or final first-aid instructor's certificates, raising the total number to 11,852 issued in 42 States since 1930. Certificates of 100-percent first-aid training were awarded to 405 mines or plants in 24 States in which every person had taken the Bureau of Mines first-aid course; to June 30, 1939, these certificates of 100-percent first-aid training had been issued to 2,315 mines and plants. On an average, 213 of these 100-percent first-aid certificates have been issued per year for the past 6 years.

In 1939, 118 expert mine rescue men took the Bureau's advanced course in mine rescue and recovery operations and earned certificates, bringing the total to 3,281. The Bureau's accident-prevention course for higher coal-mining officials was given to 534 persons; in all, 8,193 of these certificates have been issued in 16 States since 1930. Five new safety clubs (Holmes Safety Association chapters) were established in 4 States; the number of these mining-community safety organizations now totals 477, and they represent 28 States.

Numerous special studies and reports were made on rock dusting, ventilation, electricity, haulage, air conditioning, wetting methods, detecting gases, testing roof, reducing air dustiness, and other health and safety phases of the mineral industries.

The members of the Safety Division assisted in conducting 68 first-aid contests in 16 States and in British Columbia; prepared and conducted 26 safety exhibits and demonstrations in 12 States; attended 681 safety meetings in 38 States; and prepared 55 manuscripts for publication. As a means of disseminating safety knowledge, sound has been reproduced on five silent motion pictures which have been shown before more than 38,000 persons in the mineral industries at 217 meetings.

Recommendations and conclusions.—The services of the Safety Division are in greater demand than at any other time in its history, but with its limited personnel only a portion of the requests for services can be filled. The popularity of first-aid training is so great that other important activities of the division have suffered because of the necessity of diverting engineers as well as safety instructors to this work. Some of the engineering personnel should be returned to accident-prevention duties; this, however, would leave a shortage of instructors for first-aid training.

The accident rate in mining has been much lower in the past 6 years than in any other period in the history of the industry in the

United States, insofar as statistics show; nevertheless, the excellent records attained by some mineral establishments show that a further drastic reduction is possible.

ADMINISTRATIVE BRANCH

The Administrative Branch comprised the Information and Office Administration Divisions.

Information Division

The work of the Information Division included the editing and distribution of publications, supervision of motion-picture production and circulation, maintenance of the Bureau library, and preparation of exhibits.

Editorial.—During the fiscal year 7 bulletins, 15 technical papers, 2 miners' circulars, 1 economic paper, 70 chapters comprising Minerals Yearbook, 1939, 1 schedule, 1 annual list and index of publications, 12 monthly lists of publications, and 1 motion-picture list were edited and sent to the printer—a total of 110 printed publications. Moreover, during the year 71 publications were prepared and sent to the printer for reprinting, including 16 bulletins, 29 technical papers, 21 Minerals Yearbook chapters, and 5 other reports.

The editorial section also edited 51 reports of investigations and 58 information circulars. In addition to these, 32 periodical, cooperative, and miscellaneous reports were edited.

Owing to lack of printing funds, only a part of the Bureau's output could be printed at Government expense; consequently, 161 papers were submitted for publication in the technical and trade press. The reports handled during the year—483 in all—involved the editing of 25,740 pages of manuscript and the preparation of 1,651 illustrations.

Publications.—During the fiscal year, 170,581 copies of the free editions of Bureau publications and approximately 300,000 reports of investigations, information circulars, and monographs were distributed by the publications section. In addition, the Superintendent of Documents sold about 100,000 copies of the Bureau's printed reports.

Numerous brief statements announcing the issuance of new publications or describing current investigations were supplied to the daily and technical press.

More than 82,000 letters requesting publications or information on the Bureau's activities and general mining subjects were received.

Motion-picture production.—As a means of disseminating information on safety and efficiency in the mineral industries, the Bureau maintains what is perhaps the largest library of educational motion-picture films in the world. These films are prepared under the supervision of the division, through cooperation of industrial concerns that

bear the entire cost of production and that of providing copies for distribution. During the year, 730 sets of new films, comprising 1,497 reels, were added to the library.

Motion-picture circulation.—Circulation of the Bureau's motion-picture films is centralized in the Central Experiment Station, Pittsburgh, Pa., but there are 16 subdistributing centers for films throughout the country, selected with regard to accessibility. The films are loaned to schools, churches, civic and business clubs, miners' local unions and chapters of the Holmes Safety Association, and similar organizations. No charge is made for use, but exhibitors are asked to pay transportation charges. On June 30, 1939, the Bureau had 2,221 sets of films, including 4,160 reels and aggregating 2,021,410 feet. During the year films were shown on 90,370 occasions to an attendance of 9,136,788 persons.

Graphic services.—Graphic services, such as drafting and photography, are also centralized at Pittsburgh. Over 1,500 drawings and 5,000 blue prints were prepared and more than 18,000 prints made from negatives.

Library.—The year's accessions to the library comprised 3,934 books and pamphlets, 376 periodicals were received currently, and 6,964 books were loaned for use outside the library.

Exhibits.—The division prepared and installed exhibits illustrating Bureau activities at expositions and conventions.

Office Administration Division

The Office Administration Division is charged with handling personnel matters, property records, accounting, multigraphing and mimeographing, and general administrative routine.

FINANCES

The total funds available to the Bureau of Mines for the fiscal year ended June 30, 1939, including direct appropriations, departmental allotments, reappropriated balances, and sums transferred from other departments for service work, were \$3,085,667.75. Of this amount, \$3,010,338.28 was spent, leaving an unexpended balance of \$75,329.47. On the regular work of the Bureau, \$2,382,517.59 was expended. This figure is subject to slight corrections due to unpaid obligations.

Table 1 presents classified and complete information regarding the financial history of the Bureau since its establishment in 1910.

Table 2 gives a statement of the distribution of Congressional appropriations to the branches and divisions and the expenditure of these funds in 1939 by Bureau divisions.

TABLE 1.—Bureau of Mines Appropriations and Expenditures, Fiscal Years Ended June 30, 1911–39

Fiscal year	Appropriated to Bureau of Mines	Departmental allotments ¹	Funds transferred from other departments ²	Total funds available for expenditure	Unexpended balances	Total expenditures	Expenditures exclusive of service items ³
1911.....	\$502,200.00	\$34,200.00	-----	\$536,400.00	\$22,818.27	\$513,581.73	\$513,581.73
1912.....	475,500.00	45,640.00	-----	521,140.00	6,239.77	514,900.23	514,900.23
1913.....	583,100.00	47,850.00	-----	630,950.00	4,087.20	626,862.80	626,862.80
1914.....	664,000.00	57,307.79	-----	721,307.79	4,678.29	716,629.50	716,629.50
1915.....	730,500.00	55,424.60	-----	785,924.60	4,178.11	781,746.49	781,746.49
1916.....	757,300.00	48,710.87	-----	806,010.87	9,058.63	796,952.24	796,952.24
1917.....	981,060.00	52,400.00	-----	1,033,460.00	48,588.10	984,871.90	984,871.90
1918.....	1,467,070.00	51,901.98	\$3,062,000.00	4,580,971.98	395,745.10	4,185,226.88	1,172,939.64
1919.....	⁵ 3,245,285.00	49,542.86	⁶ 8,600,000.00	11,894,827.86	2,452,236.78	9,442,591.08	1,137,471.37
1920.....	1,216,897.00	52,800.00	-----	1,269,697.00	9,592.18	1,260,104.82	1,245,891.36
1921.....	1,362,642.00	62,618.72	666,720.00	2,091,980.72	13,985.89	2,077,994.83	1,412,923.15
1922.....	1,474,300.00	59,800.00	182,200.00	1,716,300.00	52,120.45	1,664,179.55	1,483,038.47
1923.....	1,580,900.00	70,814.30	97,100.00	1,748,814.30	10,959.08	1,737,855.22	1,640,840.57
1924.....	1,784,959.00	50,710.00	347,820.00	2,183,489.00	38,085.43	2,145,403.57	1,804,800.41
1925.....	2,028,268.00	57,500.00	236,465.86	2,322,233.86	107,743.20	2,214,490.66	1,998,669.20
1926.....	1,875,010.00	81,220.00	510,501.15	2,466,731.15	28,891.78	2,437,839.37	1,841,150.80
1927.....	1,914,400.00	94,443.39	325,000.00	2,333,843.39	44,871.29	2,288,972.10	1,926,910.12
1928.....	3,025,150.00	113,266.45	328,000.00	3,466,416.45	⁷ 736,235.62	2,730,180.83	1,907,270.66
1929.....	2,725,118.00	103,000.00	205,500.00	⁷ 3,753,094.67	⁸ 152,701.34	3,600,393.33	2,230,960.68
1930.....	2,274,670.00	123,300.00	166,200.00	⁸ 2,684,386.38	⁹ 135,714.93	2,548,671.45	2,216,995.72
1931.....	2,745,060.00	120,680.91	166,500.00	⁹ 3,134,595.10	¹⁰ 195,534.37	2,939,060.73	2,304,121.45
1932.....	2,278,765.00	137,866.48	194,500.00	¹⁰ 2,770,712.18	¹¹ 314,689.43	2,426,022.75	2,186,799.92
1933.....	1,860,325.00	75,100.00	184,000.00	¹¹ 2,361,138.96	¹² 475,895.41	1,885,243.55	1,710,949.42
1934.....	1,574,300.00	50,230.00	17,000.00	¹² 1,872,586.04	¹³ 397,131.28	1,475,454.76	1,254,846.72
1935.....	1,293,959.07	50,000.00	126,513.10	¹³ 1,520,472.17	¹⁴ 34,154.47	1,486,317.70	1,349,490.11
1936.....	1,970,311.00	69,500.00	47,570.00	¹⁴ 2,114,966.51	¹⁵ 14,074.34	2,100,892.17	2,052,751.87
1937.....	2,093,200.00	69,000.00	73,000.00	¹⁵ 2,235,212.45	¹⁶ 8,700.66	2,226,511.79	2,161,472.73
1938.....	2,272,696.99	83,000.00	62,300.00	¹⁶ 2,421,962.44	¹⁷ 59,899.12	2,362,063.32	2,286,856.42
1939.....	2,856,307.32	88,790.00	96,650.00	¹⁷ 3,085,667.75	¹⁸ 75,329.47	3,010,338.28	2,382,517.59
1940.....	2,533,160.00	93,290.00	66,200.00	¹⁸ 2,765,197.06	-----	-----	¹⁹ 2,595,250.00

¹ Includes printing and binding, stationery, and contingent funds.² Includes proceeds from sales of residue gas.³ Service items include Government fuel yards, helium, and other investigations and services for other departments.⁴ Includes gas investigations for War Department.⁵ Includes \$1,586,388 for Government fuel yards.⁶ Includes War Minerals Relief Commission, \$8,500,000.⁷ Includes \$719,476.67 unexpended balance reappropriated.⁸ Includes \$120,216.38 unexpended balance reappropriated.⁹ Includes \$102,354.19 unexpended balance reappropriated.¹⁰ Includes \$159,580.70 unexpended balance reappropriated.¹¹ Includes \$241,713.96 unexpended balance reappropriated.¹² Includes \$231,056.04 unexpended balance reappropriated.¹³ Includes \$50,000 unexpended balance reappropriated.¹⁴ Includes \$27,585.51 unexpended balance reappropriated.¹⁵ Includes \$2,612.45 unexpended balance reappropriated.¹⁶ Includes \$3,965.45 unexpended balance reappropriated.¹⁷ Includes \$8,399.29 unexpended balance reappropriated, and balance of \$35,521.14 receipts from sale of helium and other products.¹⁸ Includes \$13,808.01 unexpended balance reappropriated, and balance of \$58,739.05 receipts from sale of helium and other products.¹⁹ Estimated.

TABLE 2.—Bureau of Mines Expenditures, Fiscal Year 1939

Branch or division	General expenses	Operating rescue cars and stations	Testing fuel	Mineral mining investigations	Oil and gas investigations	Expenses mining experiment stations	Economics of mineral industries	Care, etc., buildings and grounds, Pittsburgh, Pa.	Acquisition of helium properties	Laboratory, Boulder City, Nev.	Appreciation of foreign currency	Helium production	Engineering, Bureau of Engineering	Development and operation helium properties	Working fund T.V.A. transfer	Printing and binding	Department contingent expenses	Total
Office of the Director	\$11,600	\$78				\$820												\$12,498
Office of the Assistant to the Director	9,660					252												9,912
Total	21,260	78				1,072												22,410
Administrative Branch:																		
Office Administrative Division	41,774	27,482	\$225			1,220	\$9,825					\$3,580		\$654			\$5,959	92,473
Information Division	963	12,652	13,749	\$9,953	\$15,257	23,376	8,872	\$5,611								4,491		94,924
Total	42,737	40,134	13,974	9,953	15,257	24,596	18,697	5,611				3,580		654		6,245	5,959	187,397
Technologic Branch:																		
Coal Division		123,902	236,107					89,248										402,525
Explosives Division		77,878														13,268		80,154
Metallurgical Division				128,120		179,180				\$5,999						2,276		314,201
Mining Division		49,279		124,575		5,855							\$7,931			9,902		196,552
Nonmetal Division						154,107									\$16,776	8,912		171,733
Petroleum & Natural Gas Division					244,458				\$537,975			61,911		23,700		6,757		874,801
Principal Mineral Technologist				7,700														7,700
Total		251,059	236,107	260,395	244,458	339,142		89,248	537,975	5,999		61,911	7,931	23,700	16,776	32,965		2,107,666
Economics Branch:																		
Coal Economics Division							25,120									428		25,548
Mineral Production and Economics Division							96,942									25,026		121,968
Nonmetal Economics Division							51,102									1,044		52,146
Foreign Minerals Division							26,802				\$244					93		27,139

THE NATIONAL PARK SERVICE

Arno B. Cammerer, *Director*

DURING the past year the place of recreation in our industrialized society has been recognized as never before. As the Nation has become more mechanized and motorized, as life and its problems have become more complex and intensified, the principle that outdoor recreation is essential to life has been more widely accepted. It has been realized in the United States that our parks and forests, our monuments and historic shrines, our wide open spaces of the desert and the mountains—all are necessary both for recreation and so that man may get away from and think more clearly amid natural surroundings.

The conservation of citizenry through outdoor recreation now is looked upon as one of the chief functions of government. This recognition is reflected in the many State recreational reports, recommendations, and plans presented during the year for review and perfecting by the National Park Service. These reports have been studied so as to focus all interest, private, State, and national, upon a common objective—the proper public use and preservation of resources that contribute to recreation and inspiration.

SUMMARY

The four regional organizations whose set-up was reported last year functioned smoothly during their first year of complete service. They proved their effectiveness as administrative units, relieving the Washington Office of a multiplicity of details. Through the relatively close contact they maintain with the national parks and monuments, the regional offices contributed effectively to the broad park program; and the amicable relations maintained by them with State and metropolitan park authorities advanced the National Park Service leadership in that field.

Also through the public contact work of the regional offices the general public has gained a better understanding of Department and Service policies and objectives in their relation to conservation, recreation, and general park administration.

The region 3 headquarters unit at Santa Fe, N. Mex., for which gift of land was reported last year, was completed. The new structure, of adobe brick and following the Spanish and Mexican patio motif,



NATURE'S MONUMENTS IN SEQUOIA NATIONAL PARK.

These giant trees are preserved under the conservation program of the Department of the Interior.



was the result of cooperation between the Service, the Civilian Conservation Corps, and the Public Works Administration.

Additional areas, significant for their historic or scenic exhibits, were brought into the Federal park system during the year. Five national monuments and three national historic sites were established, increasing the system to a total of 154 units. With these new areas and boundary adjustments of existing parks and monuments, the total area of the Federal park system was increased from 19,193,933 to 20,817,228 acres.

More than 16,250,000 persons visited the Federal parks during the travel year ended September 30, 1938. President Roosevelt again headed the visiting list, participating in the observance of the 75th anniversary of the Battle of Gettysburg at Gettysburg National Military Park and in the Nation's Christmas Tree ceremonies in the National Capital Parks. He also visited Yosemite National Park.

The National Park Service also was host to their Britannic Majesties, King George VI and Queen Elizabeth, in the National Capital Parks; to Crown Prince Frederick and Crown Princess Ingrid of Denmark in Yosemite and Grand Canyon National Parks and at the Boulder Dam National Recreational Area; and to Crown Prince Olav and Crown Princess Martha of Norway at Glacier, Grand Canyon, Mount Rainier, and Yellowstone National Parks.

Visitors to the Federal parks came from all the States of the Union and most of its territories, and from many foreign countries.

Winter sports use of the national parks showed a strong upward trend. Skiing continued to lead in popularity and was enjoyed informally on simple slopes, as well as on steep, marked ski runs. Interest in skating continued to increase, and other forms of winter sports also had their devotees.

The series of lectures conducted in Washington midweekly from October to May met with even greater popular acclaim than previously. Nineteen of these lectures were presented, attended by over 23,000 persons. Frequently, several hundred were turned away from a lecture hall already filled to capacity. The talks covered different phases of national park work, and varied from straight travel talks to popularly phrased lectures on history, geology, biology, and archeology. In addition, several popular guest speakers talked on foreign lands.

Acquisition of the Chesapeake & Ohio Canal, to be administered as one of the recreational areas of the National Capital Parks, brought into the Federal park system the historic old canal with towpath, lock houses, inns, and other buildings having historic associations with the early development of the trade routes from the

rich Cumberland Valley to the old port of Georgetown, now part of the National Capital.

Protection of the Appalachian Trail, famous hiking way leading through the eastern mountainous areas from Maine to Georgia, gained impetus during the year from the joint action of the National Park Service and United States Forest Service. The two Bureaus mutually agreed to promote the Appalachian Trailway, as it passed through national parks and national forests, as a distinct type of recreational area devoted particularly to hiking and camping.

Intensive training and additions to fire-prevention personnel and equipment, together with favorable weather conditions, resulted in a ten-year low record of fires in the Federal park areas. A total of 1,279 acres were burned over in 416 fires. Seventy-three percent of the blazes were man-caused. The Service is working progressively through various informational channels toward the enlightenment of the public in the dangers inherent to the handling of fires in forested areas, especially during dry seasons.

The outstanding wilderness preservation project before the Service is the establishment of the Kings Canyon National Park in California. So magnificent is this wilderness country that efforts to bring it within a national park were begun as early as 1881, and these efforts have continued ever since—only to be met by continuous opposition from various commercial interests. During the past year active support for the project grew by leaps and bounds, endorsements from conservation, civic, and outdoor associations running into the hundreds and representing many thousands of individuals. Legislation to establish the park passed the House during the first session of the Seventy-sixth Congress, and was reported favorably by the Senate Committee on Public Lands and Surveys.

Meanwhile, pending establishment of the Kings Canyon National Park, negotiations were proceeding at the end of June for the acquisition of several tracts of land on Redwood Mountain, which will be part of the park when established. These private holdings contain over 4,000 acres of very fine sequoia forest land. It is expected that the largest tract, consisting of approximately 2,680 acres, will shortly be turned over to the Federal Government.

The long fight to acquire the Carl Inn Tract of giant sugar pines for addition to Yosemite National Park culminated successfully, saving thousands of acres of the dwindling forests of this rare tree from the lumberman's axe.

In the field of historic conservation the year 1939 was notable for the acquisition of New York's famous subtreasury, located on the site of the old Federal Hall, scene of some of the most momentous occurrences in early American history. In Federal Hall, George Wash-

ington was inaugurated first President of the United States. There the first Congress under the Constitution convened from April 1789 to August 1790. The President's executive offices were there, and there the Supreme Court and the Cabinet came into being. Previously the Stamp Act Congress, assembled there in October 1765, was the first effective attempt at united Colonial opposition to Parliamentary taxation. From 1785 to 1789 the Congress, established under the Articles of Confederation, met in Federal Hall, in 1787 enacting its most important legislation, the Northwest Ordinance, which formulated principles by which new States were admitted to the Union on an equal basis with the older States.

Fort Laramie National Monument, Wyo., was another exceptionally noteworthy historic acquisition. Closely associated with the heyday of the western fur trade (the 1830's), with famous trappers and explorers of the pioneer period, and with the great overland migrations over the Oregon Trail—Fort Laramie was an outpost of military protection second to none in American frontier history. Its story will occupy an important place in the Service's historical program, illustrating significant features of the development of the trans-Mississippi West.

The serious shortage of trout eggs for planting throughout the West focused attention upon Yellowstone Lake, in Yellowstone National Park, as the major source of black-spotted trout eggs, for planting not only in national parks but in other lakes and streams throughout the West. Construction of a new fish hatchery was begun at Glacier National Park, and facilities improved at Yosemite for taking rainbow trout eggs. A scientific stocking program under way in the Great Smoky Mountains National Park is making that area a model of fisheries technique throughout the United States. All fisheries activities in the Federal parks are carried on in cooperation with the Bureau of Fisheries.

Two wildlife studies of prime significance centered around the status of predators in the national parks and the use of range lands by both native and domestic animals. Especial studies were made of coyotes and wolves in relation to other animal life.

A conference of national park superintendents, regional directors, and other key field people was held in Washington in January. At the request of the Secretary of the Interior the conference studied present methods of operating, developing, and administering the Federal park areas, with a view to effecting all possible improvements in service to the traveling public. A conference of chief clerks of the national parks also was held in Washington in February, as part of the program to establish close harmony of action between the Washington headquarters and the field.

An initial step toward accomplishing the Department's policy of Government construction of new facilities in the Federal parks, for operation by private concessionaires, occurred in Bandelier National Monument, N. Mex., with the completion of the new Frijoles Lodge, built by C. C. C. labor under National Park Service technical direction.

Two operators of park accommodations, the Yellowstone Park Co. and the Yosemite Park & Curry Co., joined forces in a practical effort to design a satisfactory minimum cost prefabricated housing unit. As a result, a new unit, for which plans have already been approved by the Service, is to be constructed in the Old Faithful area of Yellowstone National Park.

A new type of winter accommodations was introduced at Fort Jefferson National Monument, in Florida's Dry Tortugas Keys, with the awarding of contract to a boat transportation company to anchor a houseboat off the historic fortress to furnish meals and overnight accommodations.

In line with the governmental policy to establish the national parks more nearly on a "pay as you go" basis, so far as administration and protection of these areas is involved, the existing national park fees were revised and new fees of a more uniform nature established. It is realized that few of these Federal park areas can be self-supporting, but the opinion of the Bureau of the Budget and of Congress is that visitors actually enjoying the benefits from the millions of dollars annually expended in their upkeep and development should pay, in slight measure, toward their maintenance.

On June 30 the Branch of Buildings Management was transferred to the new Federal Works Agency. During the 6 years the buildings unit functioned under the National Park Service (it was transferred to the Service in the consolidation of park activities in 1933) its scope increased from the management of 45 buildings and 5 memorials in Washington, D. C., to the operation of 128 buildings and 7 memorials in the National Capital and maintenance of 14 buildings in 11 other cities.

Continued use of Civilian Conservation Corps labor was productive of excellent results. Outstanding was the assistance furnished in timber salvage and clean-up activities, for fire protection, following the September hurricane and floods in New England.

Facilities to meet recreational needs in 27 State, county, and metropolitan parks were completed by C. C. C. camps under National Park Service direction and the camps thus released transferred to other areas.

The Service continued cooperation in 45 States in the conduct of the park, parkway, and recreational-area study authorized by Congress

in 1936; and also furnished planning and consultation service to States requesting guidance in building up their State park programs. Over 5,000 job plans for construction work in State, county, and municipal parks were furnished various State park authorities.

The United States Travel Bureau was transferred from the National Park Service to the Secretary's Office on March 28, while bills to broaden its authority were pending in both houses of Congress. Highlight of the Travel Bureau year was the appointment by the Secretary of an Interdepartmental Travel Advisory Committee. A field office was established in San Francisco, with a branch on the grounds of the Golden Gate International Exposition.

PRESERVATION OF HISTORIC VALUES

Conservation of the Nation's archeological, prehistoric, and historic assets is a Service obligation that yearly grows in importance and scope. The past year has seen outstanding accomplishments in this field. Some of America's most dramatic landmarks were rescued from premature destruction and made safe for posterity. Notable among such were Fort Laramie, Wyo., where disastrous deterioration was taking place, and the historic Chesapeake & Ohio Canal. The acquisition of the Subtreasury in New York City, and the Old Philadelphia Customhouse, and the preservation of the Saratoga Battlefield, in New York, through legislation, also completion of land purchases for the Jefferson National Expansion Memorial, Mo., were other conservation objectives attained.

Preservation of long-cherished landmarks by stabilization and repair assures new leases of life to such national shrines as Fort McHenry, Baltimore, birthplace of the Star-Spangled Banner, and the Lee Mansion, in Arlington National Cemetery. At Gettysburg, Pa., dedication last year of the Eternal Light by the Blue and the Gray, symbolizes the peace and indissolubility of the Union. Restoration of the waterfront at Salem Maritime National Historic Site; the repairs on the Statue of Liberty, "best-known landmark on the globe;" archeological research and protective work at such unique archeological areas as Ocmulgee, Ga., Chaco Canyon, and Aztec Ruins, N. Mex., were other milestones in conservation progress.

HISTORIC SITES SURVEY

The Nation-wide Historic Sites Survey, supervised by the Advisory Board on National Parks, Historic Sites, Buildings and Monuments, is proceeding according to a chronological, thematic program as a continuing activity.

Studies of Spanish and French exploration and colonization which last year culminated in a final report on sixteenth-century sites, this

year were focused on preliminary research on those of the seventeenth century. Out of 81 sites inventoried in the final report, 8 were recommended as of national significance, and for protection through Federal, State, and local collaboration.

The Service has continued to profit by the valuable assistance made available since 1934 by the Smithsonian Institution. Similarly, the Library of Congress, the National Archives, the Historic American Buildings Survey, and various universities and museums have rendered scientific aid.

Educational work has been increasingly emphasized by historical technicians of the Service, and highest scientific standards have been followed in all work of preservation and restoration, always based upon intensive scholarly research. The master plans have profited by these studies, which provide data on the physical aspects and historic points of areas when at the zenith of their historical significance, and strike the keynote for interpreting them through the museum story, the park literature, and guided tours by which the public derives maximum information from such sites.

HISTORIC AREAS POPULAR

Eight million people visited historical areas during 1939. Legions of school children, often in classes, were included in the number. By means of the above contacts and interpretations, their patriotism was revitalized, and deeper appreciation was fostered for the meaning—and price—of democracy.

Record-breaking attendance at seventy-fifth anniversaries of Civil War battles, celebrated at Gettysburg, Chickamauga, and Vicksburg, also revived interest in American history. That at Gettysburg was nationally publicized and marked the final joint reunion of the Union and Confederate veterans.

ASSISTANCE IN STATE PROGRAMS

C. C. C. projects have been incalculable assets in enabling preservation of America's historic and archeologic treasures, providing labor for repair, erosion control, preservation of earthworks, caulking of joints, and stabilization of ruins. C. C. C. and W. P. A. projects also have been utilized for archeological research in field and laboratory and in State-wide surveys. All such projects, also those of the E. R. A. and W. P. A. in Federal and State parks, have been checked from angles of archeological and historical research by the Service, which is now responsible for the basic soundness of all historical restoration and preservation undertaken by the Federal Government. Archeological projects undertaken through Federal emergency funds have been jointly checked by the Service and the Smithsonian Institution.

The Service has continued its cooperation with State agencies in the planning of State programs of historical and archeological conservation, utilizing the labors of the C. C. C. in parks of this type throughout the United States.

PRESERVATION OF GREAT SMOKY MOUNTAINS CULTURE

Attention has been given to the unique opportunity presented in the Great Smoky Mountains National Park to preserve frontier conditions of a century ago, which have vanished elsewhere. The cultural and human interest aspects of this park are as outstanding as its scenery and vegetation. The whites of the southern Appalachians still exhibit the ruggedness and self-sufficiency of the pioneer period during which they settled this region shortly after the American Revolution.

Several typical mountain habitations remain intact within the park boundaries and may constitute valuable outdoor exhibits in any ultimate materialization of the "proposed museum of mountain culture." Already large collections of household goods, tools, farm equipment, weapons, chiefly primitive and hand-wrought, have been made. When properly studied from the viewpoints of technology and social anthropology, these should make available valuable data on the daily life of the mountain people. Studies of the folklore, ballads, linguistics, genealogy, and local traditions initiated several years ago are being continued. In preview these cultural studies contemplate a regional picture of native folk life in the Great Smoky Mountains unique in American historical experience.

ADVISORY AND TRUST FUND BOARDS

Maj. Gist Blair, long associated with the movement for historical conservation, was appointed to the Advisory Board on National Parks, Historic Sites, Buildings and Monuments, to succeed Archibald M. McCrea, deceased. Dr. Frank M. Setzler, head curator of anthropology, National Museum, Smithsonian Institution, succeeded Dr. Alfred V. Kidder, resigned.

The trust fund administered by the Service's Trust Fund Board now amounts to approximately \$12,000. Annual interest on investments increased the fund in 1939 by \$343.65.

HISTORIC AMERICAN BUILDINGS SURVEY

The long-planned catalog of drawings and photographs of historic buildings of this country included in the permanent graphic records being made by the Survey was compiled and published during the year. Sales during the first four months of its availability indicate that it is filling a need long felt by architects, archeologists, historians, and college and public libraries.

The fiscal year 1939 was the sixth year of continuous field work on this project and under the supervision of the National Park Service a number of State W. P. A. and several university collaborative programs were organized or continued. The measured drawings which have been placed in the Fine Arts Division in the Library of Congress now total more than 16,000 and architectural photographs exceed 17,000.

These records have been widely used. Even Hollywood's large motion-picture companies have called on them for details to be used in the design of historic and typical buildings for major productions, such as the New Orleans settings for "The Buccaneer" and "Jezebel," and pioneer towns for a number of western pictures.

During the year, the Survey, through a three-party agreement between the National Park Service, the Library of Congress, and the American Institute of Architects, continued to record first those historic structures in danger of destruction, in States where work relief projects for this purpose could be organized.

FOREST PROTECTION AND FIRE PREVENTION

Fire record.—The forest fire record for the period January 1 to December 31, 1938, is one in which the National Park Service can well take pride. The total number of fires affecting the national parks and monuments was 416, of which 113, or 27 percent, were caused by lightning and 303, or 73 percent, by human agency. The average annual total for the past 10 years is 350 fires, but during that period there has been a great increase in the total area of the national park system and an even greater increase in the number of park visitors. This makes it all the more remarkable that the total area burned in the national parks and monuments during the calendar year 1938, 1,279 acres, is the lowest annual loss during the past decade. The average acreage per fire of only 3 acres is likewise the best record the Service has recorded since fire records were initiated in 1928. While favorable weather conditions contributed toward this excellent record, more intensive training and additional fire guards and equipment were important factors.

Fire protection training.—During the past year special emphasis has been placed upon fire protection training. No. C. C. C. enrollee or supervisory officer is permitted to participate in fire-suppression activities until he has been given training in fire-suppression technique and safety requirements. This has resulted in an increased interest in fire prevention and suppression, a more thorough realization of the duties and responsibilities of each member of the fire-protection organization, and greater efficiency in all phases of the protection work.

Fire equipment.—Added protection for both forests and buildings was provided by the purchase of three 1½-ton fire trucks, equipped with water tanks, pumpers, and hose, for Zion and Mesa Verde National Parks, and Shiloh National Military Park and a larger truck with a 750-gallon-per-minute pumper designed for building-fire protection, for the Mammoth Hot Springs section in Yellowstone National Park. Ten recreational demonstration areas were supplied with portable pumpers and hose.

Detection system.—Improvement in the detection system for Mammoth Cave National Park was provided by the installation of three steel lookout towers, forming the primary detection system for that park. A steel lookout tower was likewise erected in Saguaro National Monument, Ariz., and one in the Lake of the Ozarks Recreational Demonstration Area in Missouri. Additional fire-lookout structures are under construction in Mesa Verde, Great Smoky Mountains, and Shenandoah National Parks.

Protection planning.—The National Park Service has assembled fire-protection statistical data over a 10-year period which will be invaluable in a study of its fire-protection problems with a view to improving its protection facilities and organization. A detailed study of the statistics for each individual park has been launched, and it is hoped that within the next year revised programs of fire-protection requirements will be completed for each national park and monument. As a part of this program of utilizing vital statistics, additional fire-weather stations have been installed in the national parks and monuments in order to cooperate with the Weather Bureau in its fire-weather forecasting, and also for the measurement and evaluation of the factors affecting local forest-fire danger. Thus park organizations will not be caught unawares by emergency conditions, which have been the cause of numerous disasters in the past.

C. C. C. and forest protection and fire prevention.—As in preceding years since the establishment of the Civilian Conservation Corps, that organization has been the mainstay for fire-fighting forces, as well as for insect and tree disease control, tree preservation, and fire-protection improvements. Great credit is due the C. C. C. for its accomplishments along these lines. The forest-protection and fire-prevention appropriation under the regular Interior Appropriation Act provided funds only for the most essential needs for fire-protection personnel and equipment that could not be supplied under the C. C. C. program.

Insect control.—In the eastern States the beech-scale infestation in Acadia National Park is the most serious threat to the park forests at present. Spraying operations were continued during the past spring for the control of this epidemic within the park.

In the West, control work was continued in Rocky Mountain National Park for the Black Hills beetle in ponderosa pine, and also in Jewel Cave National Monument in South Dakota. The mountain-pine-beetle infestation still is serious in the forests of Yellowstone and Grand Teton. In the latter park experiments were carried on by the Bureau of Entomology and Plant Quarantine for the control of the mountain pine beetle in lodgepole pine by spraying the infested boles with penetrating oils. This method proved so successful experimentally that it is to be used on a control project in Grand Teton this season. In Yosemite National Park the needle miner still continues to threaten the lodgepole pine forests.

White-pine blister rust.—In the East, white-pine blister rust control has been continued in Acadia and Shenandoah and has been extended to Great Smoky Mountains National Park.

In the West, the advance of the white-pine blister rust to the sugar-pine forests of California has necessitated rapid expansion of the Ribes eradication work in the national parks of that State. Through the cooperation of the Division of Plant Disease Control of the Bureau of Entomology and Plant Quarantine, advance checks in all of the parks have developed a program which calls for the control of the disease on 400,000 acres of land containing the various species of five-needled pine in the western region. The greater proportion of this area lies in the sugar-pine stands of Yosemite and Sequoia National Parks. To date, initial eradication of Ribes has been accomplished on 28,447 acres within the western parks, which represent roughly seven percent of the area which must be covered in the national parks of the Pacific Coast States.

At the present time this work in the national parks is conducted entirely under the C. C. C. program. If control is to keep ahead of the advance of the disease, additional funds in large amounts will have to be made available under regular appropriations. Outside of fire protection this is the biggest forest protection problem with which the Service is faced.

Campground protection.—Last year a study of the most intensively used campgrounds was inaugurated in the western national parks, in order to determine the present condition of the trees and other vegetation and the measures essential to protect these campgrounds from further rapid deterioration. This is one of the most urgent forest protection problems of the Service today.

Type mapping.—During the past year the type map of Great Smoky Mountains National Park was completed. Last winter and up to June 30 a crew of 20 was employed under an E. R. A. project in the western region to prepare and color a large number of type maps for park areas in all regions.

Forest nurseries and planting.—Forest nurseries were operated in Sequoia, Yellowstone, Great Smoky Mountains, and Shenandoah National Parks, producing 2,627,000 seedlings. In addition, more than a million seedlings were obtained from Soil Conservation Service and Forest Service nurseries for planting on areas within the national-park system.

PLANNING AND CONSTRUCTION

P. W. A. funds made possible the inauguration of construction of a number of long-needed building projects, including administration buildings at Shenandoah, Great Smoky Mountains, and Olympic National Parks, and Muir Woods National Monument, also water and sewage system extension where urgently needed. Many smaller projects, such as employees' residences, museum extensions, and small utility buildings, were also provided. Acquisition and development of large tracts of additional land adjacent to established national parks with other P. W. A. funds necessitated general development studies covering the Redwood Mountain area near General Grant National Park and the pending seacoast addition to Olympic National Park.

Work on the historic Chesapeake & Ohio Canal, which was acquired with P. W. A. funds and is to be restored and developed as a recreational area, was a major project of the year. Extensive property, topographic, and hydrologic surveys were made in connection with its acquisition and restoration, and construction was inaugurated. Two C. C. C. camps were established to clear trees and brush from the canal bed, to restore the towpath and the canal cross-section so that it could again carry water. In addition, many of the decayed lock gates between Seneca Creek and Georgetown were rebuilt and the stonework in the lock structures repaired. Work has started on restoration of lockkeepers' houses, and measurements and studies have been made in connection with the Great Falls Tavern.

The new hotel at McKinley Park Station, Mount McKinley National Park, Alaska, was completed December 15, 1938, except for the final outside coat of paint and installation of water-softening material, items which had to wait for warmer spring weather. The National Park Service undertook the design and construction of this development for the Alaska Railroad, work starting on the ground in August 1937. An additional wing of bedrooms was added and corresponding enlargement of the dining room made. Grading and landscaping the hotel grounds were being carried on during the summer of 1939 by C. C. C. labor.

Another interesting development of the year was the placing of the Laura Spelman Rockefeller Memorial plaque in the Great Smoky Mountains National Park. This is known also as the "Founders Plaque." Funds in the amount of \$10,000 each were appropriated by

the States of Tennessee and North Carolina for the erection of such a plaque and its implacement on the State line in the park to commemorate acquisition of park lands by the generosity of Mr. John D. Rockefeller, Jr., and the commendable efforts of the citizens of the States of Tennessee and North Carolina. The firm of Olmsted Bros. was commissioned by the two States to prepare general development plans of a suitable memorial and the plaque was designed and executed by Paul Manship, the sculptor. Construction of the development was under the immediate supervision of Park Service technicians furnished for the purpose from the Service and employed by the two States.

On the Thomas Jefferson Memorial project, specifications were reviewed, work advertised, and four contracts involving \$2,596,196.75 were awarded. The present year will see the superstructure construction only starting, the foundation contract completed, and two minor contracts, covering the general landscape plan and preliminary roadway relocation, wholly completed.

Appropriations available for planning and construction were not large during the year, compared with allotments of recent years, so that few new projects other than buildings were started, and money was allotted to continue construction on only the most urgent road projects, including two new approach roads to western national parks, the Fresno-General Grant approach road and the Zion-Bryce Canyon approach road. The only new road begun was one of three miles to reach the Hemenway Wash development in Boulder Dam National Recreational Area.

During 1939, approximately 850 engineering job plans for national parks and monuments were reviewed in the Washington office, covering practically all types of park construction, except major roads, and including work to be performed under regular, C. C. C., P. W. A., and other emergency funds. In addition, more than 5,000 job plans for similar work in State park, recreational demonstration, and land development areas were reviewed by the Service's regional engineering staffs, and technical assistance given to State authorities in both planning and construction.

As in the past, the Bureau of Public Roads of the Department of Agriculture continued major road-building for the Service.

The work of the Engineering Laboratory gradually increased during 1939, and requests for soil investigations for numerous jobs, especially on dams and roads, overtaxed both facilities and personnel as the value of laboratory analysis became more apparent to the field. A lecture course on soil mechanics was given in the laboratory during the winter and was attended not only by members of this Service but also by the principal engineers of several other Federal Bureaus.

Through the work of the Sign Committee, road sign standards of the American Association of State Highway Officials were adopted for Service use and arrangements made with the District of Columbia penal institutions for their production.

PARKWAY DEVELOPMENT

Construction work on the Blue Ridge and Natchez Trace Parkways continued with regular Federal appropriations totaling \$7,000,000 for the 1939 fiscal year.

The Blue Ridge Parkway now has 113 miles graded and surfaced, an additional 20 miles graded, and 90 miles under grading contracts. It has reached a useful stage, as far as several portions are concerned, particularly the Roanoke-Asheville unit. Development of recreational parks adjacent to the parkway road continued under C. C. C. and E. R. A. forces.

On the Natchez Trace Parkway, grading was completed on three sections, totaling 34 miles in Mississippi. Surfacing will be applied to these sections this season. An additional 11 miles are under construction. Survey and location work was carried on in Mississippi, Alabama, and Tennessee in collaboration with the Bureau of Public Roads. Construction of additional sections can be accelerated as soon as rights-of-way have been acquired by the various States and deeded to the Federal Government.

The most important work on the George Washington Memorial Parkway in the District of Columbia was carried on at Key Bridge, on which an additional span is being constructed to allow the parkway to underpass it on the Virginia side, in the vicinity of Rosslyn.

CONSERVATION—NATURAL HISTORY RESEARCH AND POPULAR INTERPRETATION

Conservation, in the many-varied aspects presented in the national park and monument system, is the dominant spirit of the diversified activities directed by the Service in these Federal areas. Through interpretive programs and exhibits carried out by staff scientists, historians, and museum technicians, results of scientific research and the abiding need of conservation policies are communicated to the American people. Wildlife management, geological research, and museum planning and development have advanced during the year to new high levels and received increasing appreciation both from scientists and laymen. Permanent impetus was given museum development by appointment of a scientist, certified by the Civil Service Commission, with the title of Chief of the Museum Division. Additional technicians engaged in wildlife and naturalist research continued to be employed through the Civilian Conservation Corps.

Introduction into the parks of physical improvements, necessitated by human use, involves biotic and geologic factors. Biologists and geologists of the Service have studied problems and directed developments related to such matters as land utilization; contamination or drainage of underground water; adequacy of natural foundations for roads, tunnels, and dams; cave development; location of roads and trails; quarrying; erosion control; beach and stream development; mineral valuations; and appraisals of areas proposed for inclusion in the Federal or State park systems. These studies have aimed at minimum disturbance of geologic and biotic conditions and maximum utilization of educational values and conservation principles.

Special effort has been made to keep organized scientific and conservation groups throughout the country in touch with the policies and procedures of the Service in meeting wildlife problems in Federal areas.

Government funds have been saved and satisfactory water supplies developed in park areas by the Service's geological staff through their scientific investigation of underground water and problems therewith connected. A core drill operating in Region I was utilized in drilling water wells in State parks. Sixteen such wells and many test holes at foundation sites were completed during the year. Five mineral appraisals were completed to determine land valuations and boundary limitations.

NATURALIST SERVICES

Programs designed to interpret plant and animal life and nature's inorganic forces in terms interesting and comprehensible to park visitors and emphasizing their irreplaceable value as national resources are among the Service's most popular features. Such work is now carried on in 34 Federal park areas. A tabulation of these contacts is appended.

More than 5,000 color photographs of the parks were taken and made into lantern slides for use in the lecture program. Ever-growing interest by park visitors in making their own photographic records has been met by introducing guided camera trips and giving technical advice on use of the camera.

New types of hikes, caravans conducted to unusual places, and talks on current discoveries also stimulate popular interest in conservation and in the educational aspects of the parks. Moonlight hikes from Half Dome; spotlight caravans, disclosing game by the glare of a powerful light; and sunrise talks at Mirror Lake were innovations at Yosemite National Park. Fish and fishing-hints lectures from the famous Fishing Bridge, in Yellowstone National Park; lectures on the Nation's Capital, before the District of Colum-

bia School of Americanization; and an illustrated talk given at Casa Grande National Monument, Ariz., as background material, calculated to increase appreciation of the conducted trip through the area which follows, are highlights in the naturalists' programs. On several occasions the naturalists have gone on the air during the past year to broadcast information on their parks.

Witness to the constantly increasing interest in interpretive programs is the fact that new amphitheaters were built and increased campfire programs instituted at Rocky Mountain, Great Smoky Mountains, Mammoth Cave, and Sequoia National Parks and in the National Capital Parks.

In response to growing demands, Easter sunrise services are becoming annual features in many of the parks, where the sublimity of the natural setting emphasizes the solemnity of the ceremonies.

TRAINING OF NATURALISTS

The Yosemite School of Field Natural History, a graduate school with a college degree as entrance prerequisite, operated again during the past season, training prospective national park personnel qualified for naturalist positions. This school and the Yosemite Junior Nature School are nonprofit, scientific organizations engaged in a training enterprise helpful to the Service. The 1939 session, the 15th class of the school, began courses on June 26 with the selection of 20 students (16 men and 4 women) from more than 100 applicants.

Yale University continued its cooperation, assisting in National Park Service personnel training through awarding two graduate fellowships. The fellowships are open to those interested in graduate studies bearing upon the educational or interpretative program of the Service and may include forestry, geology, biology, history, archeology, psychology, and education.

MUSEUM PROGRAM

In the forefront of interpretive visual education is the museum program which directs the planning, construction, and maintenance of park museums, trailside structures, and exhibits of park activities displayed at expositions, conventions, and like assemblages.

The largest and most complex historical museum project yet attempted by the Service was undertaken during the year. This was the museum development for the proposed Jefferson National Expansion Memorial at St. Louis, Mo., designed to tell the epic story of the Nation's westward growth. Sample exhibits, including dioramas, models, large maps, and animated charts already have been prepared for installation in a temporary museum room at the headquarters

office in St. Louis, and extensive research studies are in progress for the basic plans of the Memorial.

Administration and maintenance of the Interior Department Museum were turned over on April 1, 1939, to the Office of the Secretary of the Interior, and a permanent curator employed. Constant revision of the exhibits keeps it abreast of current events.

Work was launched on the construction of a museum at Ocmulgee National Monument, Ga., which will become a study center for southeastern prehistory. At Guernsey Lake State Park, Wyo., where the story of the conquest of the frontier, of mining, and of reclamation is told, an outstanding exhibit was installed. Another museum exhibit is nearing completion in Custer State Park, S. Dak. A unique archeological museum to shelter excavated prehistoric burial pits was completed at Mound State Monument, Ala., through cooperation of the Service, the State, and the C. C. C.

In addition, exhibits were made for 7 national parks and monuments and three State parks by the preparation laboratories at Berkeley, Calif., and Washington, D. C., assisted by P. W. A., E. R. A., and C. C. C. funds and personnel. Much of the research necessary to the preparation of the geological and biological exhibits in these displays was done by the naturalist staff. The laboratories also supplied several hundred maps, charts, and diagrams to augment existing displays and distributed 1,359 nature trail labels, 20 plant presses, and 15 herbarium, geology, study skin, and insect storage cases.

A noteworthy accomplishment in the development of museum exhibits is found in the Southwestern National Monuments. A $\frac{3}{4}$ -ton truck was equipped with sectional, removable, dust-proof wall cases to accommodate sufficient tools, equipment, and materials to make it an efficient traveling museum preparation laboratory. The truck, manned by a staff of preparators, will travel to the various Southwestern Monuments and install museum exhibits.

Dioramas, paintings, models, and photographs were displayed at 13 fairs, conventions, and expositions during the year.

The high caliber of the Service's museum work was recognized with grants-in-aid by the American Association of Museums from funds provided by the Carnegie Corporation of New York City to two of its employees for foreign travel and museum study.

WILDLIFE PROBLEMS

In management of wildlife, the problem of relieving overgrazing has received the greatest attention during the past year. A program, authorized by the act of June 16, 1938, was actively undertaken at Wind Cave to reduce the 291 buffalo to 175, and the 150 elk to 50. Complete reduction to the numbers stated above was not possible.

during the first year of the program, but sufficient work was done to relieve materially the overgrazed conditions in the park. The Camp Fire Club of America endorsed the program of elk reduction in Yellowstone whereby a minimum annual reduction of 3,000 head by hunting in the adjoining portions of the State of Montana is being undertaken.

Problems of surplus deer populations were satisfactorily solved in Zion National Park by live trapping and shipment outside of the park of 126 head; and to Hickory Run Recreational Demonstration Area, Pa., by opening the area to hunting of antlerless deer during the regular State season. The recreational demonstration areas are not units of the Federal park system, in which no hunting is ever permitted.

Elimination of grazing by domestic stock in parks was another problem given attention in Bryce Canyon and Carlsbad Caverns National Parks, and Zion, Lava Beds, and Saguaro National Monuments. At Bryce, Zion, and Carlsbad the problem is well on the way to successful solution by inauguration of a gradual reduction, expected completely to eliminate grazing within 6 years.

Work started last year on the bear-visitor problem has continued this year with concentration upon publicity designed to control undesirable actions by park visitors. Other management projects include introduction of beaver into Shenandoah National Park and definite arrangements for such introduction at Silver Springs State Park, Oreg.; construction of nesting islands for trumpeter swans in certain lakes of Yellowstone National Park; fencing of an area in Grand Canyon National Park to exclude domestic stock and encourage increase of antelope; and inauguration of naturalistic treatment of potential wildlife areas along the Blue Ridge Parkway.

A serious shortage of trout eggs available for planting throughout the West has focused Nation-wide attention on Yellowstone Lake, now recognized as the major natural source for black-spotted eggs. Here, the National Park Service is seeking closer cooperation with the Bureau of Fisheries in the conservation of its fish resources and general fish management in all national park areas.

At Glacier National Park a fish hatchery is now under construction.

At Yosemite National Park a new dam has been installed on Frog Creek, at Lake Eleanor, to facilitate taking of rainbow eggs.

In the East a scientific stocking program has been worked out for Great Smoky Mountains National Park and the management of fish resources now being handled on the basis of this study is making the Great Smoky area a model for fisheries' technicians throughout the United States. Trout rearing pools are being developed at Cades Cove in the park.

The Service also has advised on pond construction, fish planting, and fish-food plants in various State parks and recreational demonstration areas throughout the East.

SCIENTIFIC STUDIES

Scientific research is a continuing obligation in the Service's conservation program. Among the most important of such projects were the following:

Observation to determine the temperature at which the forest was killed in the chain of craters region, Hawaii National Park.

A study of the relationship between barometric pressure and eruption of geysers at Yellowstone. A device which automatically recorded the period of eruptions was constructed as a part of this problem.

Research relating to the study of an unusual type of geologic structure, tentatively called "turtle-back" folds, found in the Black Mountains, Death Valley National Monument.

A study to determine the source and direction of movement of sediments from which the Tapeats sandstone was formed and the effect of the pre-Cambrian mountains on the sediments in Grand Canyon National Park.

An investigation of the stratigraphy in the vicinity of Grand Wash Cliff, Boulder Dam National Recreational Area.

A survey of the ground water at Cape Hatteras National Seashore Project to determine the fresh water available for development uses and the influence of pumping and drainage projects on brackish-water encroachment.

The important task of securing basic data upon which intelligently to administer wildlife resources of the parks centered around two major problems—the status of predators in the national parks and the question of range utilization by both native and domestic animals. An outstanding contribution to solution of the first problem was the completion of a coyote study in Yellowstone National Park in which over a year of field observations resulted in data definitely establishing the coyote as a natural and desirable component of the primitive biotic picture, not inimical to the well-being of any species upon which it feeds in the park, and not requiring any control at present.

Early in 1939 the study of this problem was extended to Mount McKinley National Park in Alaska, where continued pressure from several groups has demanded control of wolves. This study will continue throughout the summer of 1939 and upon its results the Service will base its management of bighorn, caribou, wolves, and other species in that park.

Studies of range utilizations in many parks have become necessary conservation measures by reason of previous unwise reduction in

numbers of predators and consequent overpopulations of browse animals, particularly deer. In addition to the studies under way, there have been special investigations by the Service staff and by cooperative agreement with other agencies of the relation between deer, domestic sheep, and sage hens at Lava Beds National Monument; conflicting use of range by concessionaire saddle horses and bighorns during lambing season at Glacier National Park; and conflict between bighorn and feral burros in Death Valley National Monument.

Related studies include an investigation of efficiency of electrified fences for necessary control of animals such as bear, deer, and bison; yield of range grasses in Wind Cave National Park; and bighorn studies in Grand Canyon National Monument and Zion National Park. Results of these studies are in many cases already being incorporated in management measures designed to remedy whatever defective conditions were discovered. Other miscellaneous research projects undertaken during the year include a study of the tern nesting colony at Fort Jefferson National Monument, Fla.; the effect of ammonium thiocyanate on rodents when used in control of *Ribes* in connection with the white-pine blister rust campaign in the California parks; mosquito control methods in various State park and recreational demonstration project areas throughout the eastern States; life history studies of the trumpeter swan in Yellowstone; and biological surveys of Mount McKinley and Mesa Verde National Parks, Organ Pipe Cactus National Monument, and the Boulder Dam National Recreational Area.

At Scotts Bluff National Monument and at Boulder Dam National Recreational Area extensive collections were made of vertebrate materials for later classification and use as articulated skeletons in museum and educational exhibits. At Organ Pipe Cactus National Monument a faunal survey was made. The three above projects benefited by cooperation of outside agencies and individuals.

At Crater Lake National Park, the National Park Service, the United States Geological Survey, and the University of California collaborated in soundings of the lake to obtain data as to its formation and the geologic history of the area.

In cooperation with the National Park Service, the Seismological Society of America and the University of California jointly loaned to Lassen Volcanic National Park, Calif., a seismograph and a short-wave radio of latest type for receiving time signals. Lassen Peak is the most recently active volcano in United States proper. Its latest eruption ceased in 1921.

The practical value of scientific research was shown in Hawaii National Park in November when, after a local seismograph registered a severe distant earthquake and the epicenter was located, it was predicted that a tidal wave should be expected to strike Hawaii

3 to 6 hours later the same day. The wave, which did no damage, arrived on schedule and caused water-level displacement of 0.6 foot to 2.5 feet on the shores of the Islands.

Use of the parks as outdoor laboratories by schools and universities continues. Many student field trips are conducted annually, and much private research is done. A notable example was that of Bruce Richardson, physiologist, and Dr. Nathaniel Kleitman of the University of Chicago who spent weeks in Mammoth Cave trying to break down the daily cycle of human life and substitute a longer (28 hours) cycle.

Dr. Alexander H. Smith, of the University of Michigan Museum, an authority on fungi, has been concerned with research in the Great Smokies, and has listed for the park approximately 400 species of the gilled fungi (*Agaricaceae*). His work, together with the findings of Dr. L. R. Hesler, of the University of Tennessee, forms a basis for future work of this branch of the plant kingdom in the Great Smokies field.

Dr. W. B. Spencer, of Wooster College, Ohio, discovered 24 species of fruit flies (*Drosophilidae*) in the Great Smoky Mountains, three previously undescribed.

A collection containing more than 1,200 specimens of insects was made, mounted, and identified by assistant park naturalist Louis Schellbach at the North Rim of Grand Canyon.

A porphyritic dike was found near Boulder Dam which is unusual because it shows that molten rock was forced into gravels which were only partially cemented, without disturbing them appreciably and without altering them by the heat or chemical activity of the magma.

A new subspecies of reptile, a bicolored ground snake, found in Grand Canyon National Park and described as *Sonora semiannulate gloydii*. So far as is known, it is unique to the Grand Canyon.

A very rare occurrence of rhyolite and basalt was found in the Gardiner River, Yellowstone National Park: a rhyolite lava flowed over basalt and digested the latter, a relationship heretofore generally considered impossible.

Discovery of an unexplored section of Mammoth Cave National Park, reportedly unsurpassed in beauty, was the outstanding event of the year for this area. Spectacular features include an onyx dam, 4½ feet high and 42 feet long, and helictites—contorted gypsum crystals—in flower-like clusters and ribbons as long as 14 inches.

The first record since 1889 of the appearance of Townsend's warblers in Grand Canyon National Park was made last September.

Scientific articles contributed by Service staff members appeared in Service publications as well as in a large number of scientific and popular periodicals.

INFORMATION SERVICE

A multifeatured information service was maintained and expanded to explain the conservation policies and procedure of the Service and also to direct attention to the attractions of and facilities available in the various Federal park areas. The press, radio, printed and processed literature, a picture-distribution service, illustrated lectures, and moving pictures all served as media to advance public knowledge of and interest in the Federal parks. The Service also utilized existing channels of information to disseminate national park facts. This involved cooperation with patriotic societies, civic and conservation organizations, study clubs, schools, and allied groups.

That the public might know of the work being done by the National Park Service, stories on all phases of its work were released to the press during the year. In addition, a wide variety of material was furnished to reporters and free-lance writers making personal requests, many of these requests being based on items furnished in releases which intrigued their curiosity and pointed the way to worthwhile feature stories.

LITERATURE FOR DISTRIBUTION

Awakened public interest in conservation, growth of travel, and the addition of new areas to the system, all united to increase greatly the need for printed literature. During the last travel year (October 1, 1937–September 30, 1938) more than 16,250,000 people visited the national parks and monuments, yet during the 1939 fiscal year the Service was able to issue only approximately 1,000,000 printed circulars of general information. In addition to the actual visitors there are hundreds of thousands of potential visitors requesting travel literature from which to plan their vacations.

In an effort to secure maximum circulation for an entirely inadequate supply of information circulars, the Service supplied libraries, schools, museums, chambers of commerce, motor clubs, and other organizations with a few loan copies. Also in several instances local chambers of commerce and motor clubs purchased supplies of booklets for distribution to their members.

It is gratifying to report that the serious situation created by this shortage of printed material was recognized by the Bureau of the Budget and the Congress, with the result that the Service's allotment for printing was substantially increased for the 1940 fiscal year. With the additional funds, and drastic reductions in the size of information circulars under way in aid of economy, the printing situation will be better next year. The Service still will be open to legitimate criticism, however, on the ground of lack of printed informational material to supply all bona fide requests.

The shortage of informative literature is particularly felt at this time, with two great expositions on our east and west coasts. Visitors display keen interest in the national park exhibits—provided largely by the States, transportation companies, and other interested agencies—and requests for information on the parks result. Not only was it impossible to relieve this somewhat impossible situation in the past, but the financial relief furnished for the current fiscal year cannot be stretched to cover this glaring shortage. Another need for increased printed literature is to cooperate with chambers of commerce, automobile clubs, gasoline stations, and other agencies reaching a large segment of the traveling public and able and willing to direct that public to the nearby national parks or those within easy range of planned travel routes. Without descriptive literature, however, such agencies find it difficult to cooperate with the Federal Government in travel promotion to the fullest possible extent.

Of prime importance in supplementing the printed literature during the past year was the issuance of brief multilithed circulars, processed in the Department.

Altogether the Service now issues 269 free informative booklets, and similar new bulletins for parks not covered by printed literature are being multilithed monthly.

A new series of informational bulletins on historic areas was planned and the first booklet "Manassas to Appomattox" issued. Copy for seven others in the series was transmitted to the Public Printer prior to June 30. The type of information furnished and the new format met with wide popular acclaim. Plans are now under way for the initiating of new series of publications, both free and sale.

To aid in a balanced publications program, a publications committee was formed to consider the relative merits of all needed bulletins and plan the output of publications according to the greatest need for special types of circulars and the printing funds available. Deserving special consideration are papers on scientific and technical subjects which should be issued both because of their wide interest in connection with park activities and to produce the greatest results from special investigations and studies. Without a final printed report, the results of some field research may be virtually lost.

RADIO

Radio, the newest form of news dissemination, is an invaluable medium in transmitting to the American public information on the national parks of the United States, thus making them travel-conscious. Aware of the possibilities inherent to this method of advertising, the Service, through the Washington headquarters, has for the past half

dozen years carried on wide-scale preparation of radio programs for broadcasting nationally, on donated time. This year—indicative of the interest in this mode of advertising and the results obtained from past radio work carried on as extra-curricular activity in connection with other activities—the concessionaires operating the accommodations for the public in the western national parks have cooperated by donating to the National Park Service funds to defray the salary of a full-time radio-script writer.

Meanwhile, the regional offices and various parks have entered the broadcasting field and during the past year produced programs of wide interest and popular appeal. This field activity is given all possible encouragement and assistance by Washington headquarters.

LECTURES

Another method of spreading knowledge concerning the parks that has a wide popular appeal is the illustrated lecture. The work done in this field by naturalists and historians in the parks is reported elsewhere. In addition, Washington and regional office officials and representatives of the various parks cooperate, as time will permit, in this form of activity in their immediate localities.

An especially enthusiastic reception greeted the series of lectures conducted midweekly from October to May in the Departmental Auditorium. Nineteen lectures were given during the 1938-39 season, touching on subjects of travel interest and on the popular sciences connected with the parks. The new natural-colored slides, which are exceptionally well adapted for depicting the colorful scenery of the national parks, added greatly to the popular interest.

More than 23,000 persons attended these free lectures, many of which were given to capacity houses. In a few instances several hundred people were turned away for lack of space. The entire program is planned and timed to listener-interest and forms an important feature of the Service's informational and publicity work.

Assistance also was given during the year to placing cooperating lecturers of high standing on various civic and educational programs.

STUDY PLANS AND ENCYCLOPEDIAS

Information was furnished to patriotic organizations, study clubs (especially of conservation organizations), schools, and other groups requesting assistance in planning study courses. The possibilities in this field are limited only by the small staff available for the work.

Each year additional editors of books of source material—encyclopedias, yearbooks, and almanacs—request information on the national parks, while those already receiving this material request check of data previously used to bring it up-to-date and in line with

new Service policies. The material furnished includes information not only on the Federal park areas, but also on the cooperation the Service furnishes State and other local park systems.

NATIONAL CAPITAL PARKS

The 717 units of the National Capital Parks system, serving Washington and adjacent metropolitan areas, were used by an estimated 50,000,000 people. In addition to the parks of all sizes, the Office of National Capital Parks supervises the Mount Vernon Boulevard.

Of unusual interest is the newest unit, the historic Chesapeake and Ohio Canal, acquired during the year through P. W. A. cooperation and placed under the jurisdiction of National Capital Parks. This was dedicated to public use as a historic and recreational area on Washington's Birthday, 1939, because of the personal interest the first President took in the canal project.

Notable also was the breaking of ground for the Thomas Jefferson Memorial on the south bank of the Tidal Basin, on December 15, 1938, with President Roosevelt officiating.

An event of chief importance to the National Capital and to its park system was the visit on June 8 and 9 of their Britannic Majesties, King George VI and Queen Elizabeth. It is estimated that approximately 90 percent of their time in Washington was spent in units administered by the Office of National Capital Parks, including the White House. This entailed a tremendous responsibility and amount of work on the part of the park police and other officials.

Construction projects carried on in the National Capital Parks system were part of the ultimate design for the Federal City. The George Washington Memorial Parkway was extended to connect Lee Boulevard with the Mount Vernon Memorial Highway (which is part of the larger George Washington Parkway plan) and with the Arlington Memorial Bridge. Further extension of the parkway to Francis Scott Key Bridge (involving the construction of an additional arch at the Virginia end of the bridge) and redesigning of the Rosslyn Plaza are in progress. Relocation of the Mount Vernon Highway between Roaches Run and Four Mile Run will be necessary because of the construction of the National Capital Airport at Gravelly Point.

Among important achievements were conversion of the Brightwood Reservoir adjacent to Sixteenth Street, into a major recreational center of Rock Creek Park; reconstruction, as a P. W. A. project, of the historic Bullfinch Gatehouses in the grounds south of the Executive Mansion; and planting of flowering dogwood trees in West Potomac Park. Progress was made in the development of

the Chopawamsic Recreational Area under C. C. C. funds. The area afforded camping facilities for five organized underprivileged groups during the current season.

District of Columbia projects which affect National Capital Park areas were the construction of the Thomas Circle underpass and the K Street overpass at Rock Creek and Potomac Parkway intersection; also the construction of a storm-water diversion sewer in Piney Branch Valley, in Rock Creek Park, and the Rock Creek and Potomac Parkway, causing temporary and perhaps permanent relocation of bridle paths. Plans for the construction of the Massachusetts Avenue Bridge to permit open valley treatment of the Rock Creek and Potomac Parkway at that point are under way.

During the fiscal year 1939 the total appropriations for National Capital Parks, including maintenance of the White House and five C. C. C. camps, amounted to \$2,398,524.93.

EXPANSION OF THE NATIONAL PARK AND MONUMENT SYSTEM

The fiscal year was characterized by continued progress in rounding out the Federal park system in accordance with long-range plans for locating, appraising, and securing lands of major importance for public-park use. Such plans contemplate the inclusion in the system of the most superb natural scenery; outstanding stretches of ocean beaches; the most instructive geological exhibits; the finest representative examples of native plant and animal life; nationally significant prehistoric and historic sites, objects, and buildings; a system of important scenic and historic parkways; and other areas that are nationally of more value for recreation than for any other use.

Although no national parks were created during the year, five new national monuments and three new national historic sites were established. These additions, with adjustments in boundaries of existing areas, raised the total acreage of the national park and monument system from 19,193,933, as of June 30, 1938, to 20,817,228 acres on June 30, 1939.

The national park and monument system on June 30 included a total of 154 areas, as follows: 27 national parks, 2 national historical parks, 11 national military parks, 78 national monuments, 8 national battlefield sites, 4 national historic sites, 1 national recreational area, 8 national memorials, 11 national cemeteries, 3 national parkways, and the National Capital Parks in the District of Columbia.

National monuments established: Fort Laramie National Monument, Wyo., July 16, 1938; Ackia Battleground National Monument, Miss., October 25, 1938; Homestead National Monument of America, Nebr., January 3, 1939; Badlands National Monument, S. Dak., Janu-

ary 25, 1939; and Santa Rosa Island National Monument, Fla., May 17, 1939.

National historic sites designated: Hopewell Village National Historic Site, Hopewell, Pa., August 3, 1938; Federal Hall Memorial, New York City, May 26, 1939; and Old Philadelphia Customhouse, Pa., May 26, 1939.

Extensions of existing Federal park areas: The largest extensions to the system were Carlsbad Caverns National Park, N. Mex., February 3, 1939, 39,488.41 acres; Dinosaur National Monument, Utah, July 14, 1938, 205,885 acres; Arches National Monument, Utah, November 25, 1938, 29,160 acres; and Glacier Bay National Monument, Alaska, April 18, 1939, 1,134,720 acres. The Cape Henry Memorial, in Virginia, was transferred from the War Department to the Department of the Interior to be administered as part of Colonial National Historical Park. This site marks the approximate scene of the first landing by Jamestown colonists in 1607.

STATUS OF FEDERAL PARK AREAS AUTHORIZED BY CONGRESS

Big Bend National Park project, Tex.—Authorized by act of Congress of June 20, 1935, was given impetus on May 12 when Governor O'Daniels approved an act of the State legislature providing for transfer of jurisdiction over 132,107 acres of State school lands within the proposed park area to the State Park Board. The act further authorized the State Park Board to acquire other lands necessary for the national park and to transfer such lands, including the school lands, to the Federal Government. With these school lands, the State now has full title to approximately 145,567 of the total of 788,682 acres needed to complete the project. It is understood that a State-wide campaign will be undertaken to raise funds by public subscription to purchase the private lands within the proposed park boundary.

Everglades National Park project, Fla.—Authorized by act of May 30, 1934. Little progress has been made during the year toward acquiring the necessary lands for this project, although the State has been encouraged in every reasonable manner to secure such lands for donation to the Federal Government before it is too late to save them from despoliation. The area is imperiled by drainage work in the Everglades. This has resulted in sweeping fires in the partially dried out marshes and invasion of salt water into large areas formerly of the fresh-water marsh type. The entire natural biotic scheme of the proposed park area is in greater danger of destruction now than ever before.

Isle Royale National Park project, Mich.—Of the 133,405 acres involved in this project, authorized by act of Congress approved March

3. 1931, title to 115,643 acres had been vested in the Federal Government by June 30, 1939. Of the remaining acreage, approximately 2,500 acres are State owned. The balance is now in process of being acquired by the Federal Government and the State of Michigan. The State has ceded complete jurisdiction to the Federal Government over all lands within the area, and now is preparing to convey the State-owned lands involved to the United States.

Saratoga National Historical Park project, N. Y.—Authorized by act of June 1, 1938, to include part of the Saratoga Battlefield now belonging to the State of New York and additional lands in the vicinity which the Secretary of the Interior may designate. On May 19, 1939, the Governor of New York approved legislation providing for conveyance of State lands to the United States and cession of State jurisdiction over the area.

Appomattox Court House National Historical Monument project, Va.—Authorized by act of Congress approved August 13, 1935. All lands within the proposed boundaries have been acquired with the exception of one tract of approximately six acres, which will be purchased with funds Congress made available for use during the 1940 fiscal year.

Cape Hatteras National Seashore project, N. C.—Authorized by Act of June 1, 1938, upon vesting of title in the United States to lands within designated boundaries. On March 30, 1939, the State of North Carolina enacted the Cape Hatteras national seashore bill, which provides for a commission to acquire title to the private lands involved, and appropriated \$20,000 to carry out the purposes of the act.

OTHER PROPOSED NATIONAL PARK AND MONUMENT AREAS

John Muir-Kings Canyon, Calif.—Hearings were held in March and April 1939 on H. R. 3794, introduced by Congressman Gearhart, of California, to include the world-famous Kings Canyon region in a national park, where its scenic beauty would be protected and dedicated to the highest use. There is no more important national-park project before the country today. The bill has the approval of both the United States Department of Agriculture and the United States Department of the Interior. It is supported by more than 165 public organizations.

The committee reported the bill favorably, but with certain amendments that would violate accepted park practice. One of the amendments would open the proposed park to water storage and power development projects. This is wholly unnecessary, since both the Commissioner of Reclamation and the Chief of Engineers, United States Army, state that the most feasible power and irrigation reservoir sites are outside of the proposed park, and their plans do not include the development of sites within the proposed park.

Provisions in the bill that would define and prescribe wilderness preservation, over and above that prescribed in the act of August 25, 1916 (39 Stat. 535), as amended, and would provide that all structures erected for public accommodation should be financed by the Federal Government, were also stricken out in the committee report. The name John Muir-Kings Canyon National Park was changed to Kings Canyon Wilderness National Park.

NOTE.—On July 18, 1939, the House, after eliminating the amendment which would authorize construction in the park for power-development and water-storage purposes, approved H. R. 3794, authorizing the establishment of the "Kings Canyon National Park."

Green Mountain, Vt.—Legislation to establish this national park (H. R. 2961) was introduced in the Seventy-sixth Congress. By joint resolution approved April 10, 1937, the General Assembly of the State of Vermont authorized the Governor to appoint a committee to study the desirability of establishing a national park within the State and to accept gifts and options of land within the proposed park area. Little progress has been made thus far due to insufficient support within the State.

Cumberland Gap, in Tennessee, Kentucky, and Virginia.—H. R. 3960 and S. 1518, now pending in Congress, propose the establishment of a national historical park and a national recreational area in this region. Cumberland Gap and its surroundings are of national historical importance as the gateway for trans-Allegheny travel to the West in the period of westward expansion just prior to and during the Revolutionary War. Strong public support is being given by local people.

Escalante, southwestern Utah.—The long-standing proposal to establish a national monument in this area received considerable attention during the year. The lands proposed for national-monument status consist of a narrow strip on both sides of the Green and Colorado Rivers from the vicinity of their junction southwest of Moab, Utah, south to the Arizona-Utah State Line. With the exception of a few homestead entries, oil and gas permits, and mineral claims, title to the 1,280,000 acres involved is vested in the United States. At the request of Governor Blood, of Utah, the national-monument proposal is being held in abeyance pending additional study to determine whether certain questions relating to potential power production in the area can be settled to the satisfaction of the State and this Department.

Ship Island, Miss.—Located in the Gulf of Mexico, near Biloxi. Monument status is suggested for this area because of its historic significance. It was an important point during first French settlement of Louisiana; was used as headquarters for the British General

Packingham prior to his attack on New Orleans during the War of 1812; and in the War between the States was a Federal navy yard for the Gulf blockading squadron. The National Park Service has continued negotiations to effect the transfer to this Department of the Federal and private lands necessary for national-monument purposes.

Manuelito, N. Mex.—For a number of years the Department has been interested in giving national-monument status to this area of notable archeological ruins. Establishment of the monument is contingent upon acquisition of alienated lands in the area. A progressive step was taken on March 13 when Governor Miles, of New Mexico, signed a State act appropriating \$12,000 toward the purchase of such lands.

Travertine Bridge National Monument, Ariz.—H. R. 5140, now pending in Congress, proposes to establish a national monument of 280 acres—just large enough to include the Tonto Natural Bridge and its immediate surroundings. The bridge, of travertine, is remarkably picturesque and impressive, and is probably unique as to its origin.

Proposed historical areas.—Under authority of the act of August 21, 1935, the National Park Service is conducting a Nation-wide survey of historic sites and preparing a long-time program for cooperative preservation and use. Many individual historic sites now are under consideration as to relative importance and necessary protection.

PROPOSED EXTENSIONS OF EXISTING FEDERAL PARK AREAS

Olympic National Park, Wash.—Studies and negotiations with local authorities continue to determine the lands that should be added to the park under the enabling act of June 29, 1938, which authorized the President, by proclamation, to enlarge the park so established to a total of approximately 898,292 acres.

Chalmette Monument and Grounds National Battlefield Site, in Louisiana, now consisting of 15 acres, should be enlarged to a maximum of 1,000 acres and its designation changed to that of a national historical park. H. R. 4742 was introduced in the last session of Congress for that purpose. It is contemplated to acquire the additional lands with a fund of \$300,000 appropriated by the Louisiana legislature for national historical park purposes.

Rocky Mountain National Park, Colo.—Enlargement of this park has been advocated by the Department for many years. Congressional bills now pending—H. R. 6655 and S. 2651, provide for a southern extension of approximately 35,295 acres and an eastern extension of 1,720 acres. The former comprises the Arapaho area, a highly important part of the superlative scenic region now within the park. The latter would help eliminate undesirable developments, enlarge the present park administration area, and make possible the construction

of a parkway from the Big Thompson River park entrance to Estes Park village.

LANDS ADDED TO THE FEDERAL PARK SYSTEM

The following lands were added to the Federal park system through establishment of new areas, adjustment of boundaries of existing areas, and acquisition of lands for authorized projects:

Acadia National Park.—Donations of 408.88 acres and recalculation of acreage changed the area of this park to 16,522.492 acres.

Ackia Battleground National Monument.—By proclamation of October 25, 1938, this monument was established, containing 49.15 acres.

Appomattox National Battlefield Site.—By executive order of February 23, 1939, this area of 963.93 acres was transferred from the Department of Agriculture for the purposes of this authorized area.

Arches National Monument.—By proclamation of November 25, 1938, 29,160 acres were added to the monument making a total of 33,680 acres.

Badlands National Monument.—By proclamation of January 25, 1939, this monument was established containing 150,103.41 acres.

Big Hole Battlefield National Monument.—By proclamation of June 29, 1939, 195 acres were added to this monument making a total of 200 acres.

Blue Ridge Parkway.—Donations of 7,545.98 acres and purchase of 10,605.90 acres increased the lands acquired for the parkway to 22,577.27 acres.

Boulder Dam National Recreational Area.—Donations of 18.83 acres increased the total holdings of Federal lands to 1,439,832.30 acres.

Carlsbad Caverns National Park.—By proclamation of February 3, 1939, 39,488.41 acres were added making a total area of 49,568.44 acres.

Chickamauga and Chattanooga National Military Park.—Donation of 3.75 acres brought the total area to 8,632.962 acres.

Colonial National Historical Park.—Acquisition of .23 acre through transfer from the War Department resulted in a total of 6,325.616 acres.

Dinosaur National Monument.—By proclamation of July 14, 1938, 203,885 acres were added to this monument, making a total area of 203,965 acres.

Federal Hall Memorial.—By departmental order of May 26, 1939, this area of 0.487 acre was designated a national historic site.

Fort Laramie National Monument.—By proclamation of July 16, 1938, this monument was established, containing 214.41 acres.

Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park.—Donations of 13.34 acres and a correction in previous acreage resulted in a total area of 2,230.971 acres.

Gettysburg National Military Park. Donation of 0.064 acre and a recomputation of the area of this military park resulted in a total area of 2,392.069 acres.

Glacier Bay National Monument.—By proclamation of April 18, 1939, 1,134,720 acres were added to this monument, making a total area of 2,299,520 acres.

Glacier National Park.—Acquisition of 63.03 acres by purchase brought the total Federal holdings in this park to 959,296.39 acres.

Grand Canyon National Monument.—Acquisition of 852.73 acres by exchange brought the total Federal holdings in this monument to 254,089.74 acres.

Grand Canyon National Park.—Acquisition of 436.02 acres by exchange brought the total Federal holdings in this park to 640,804.83 acres.

Great Smoky Mountains National Park.—Acquisition of 1,674.715 acres by donation and purchase brought the total area of this park to 439,277.365 acres.

Guilford Courthouse National Military Park.—Acquisition of 9.90 acres by donation brought the total area of this military park to 146.774 acres.

Homestead National Monument of America.—By departmental order of January 3, 1939, this monument was established, containing 160.82 acres.

Hopewell Village National Historic Site.—By proclamation of August 3, 1938, this national historic site was established, containing 213.696 acres.

Hot Springs National Park.—The acquisition of 16.681 acres by transfer and purchase resulted in a total area of 1,006.436 acres.

Isle Royale National Park project.—Donations and purchase of 2,819.88 acres resulted in a total area of 115,642.87 acres being acquired for this authorized national park, leaving approximately 18,000 acres to be acquired to complete this project.

Kennesaw Mountain National Battlefield Park.—The purchase of 930 acres resulted in a total area of 1,577.93 acres.

Mammoth Cave National Park.—The acquisition of 2,044.79 acres by donation and purchase and a correction of acreage in first deeds brought the total acreage to 40,486.38 acres, leaving approximately 10,000 acres to be acquired to complete this park.

Mount Rainier National Park.—The acquisition of 18.20 acres by purchase brought the Federal lands within the park to a total of 239,909.969 acres.

Morristown National Historical Park.—The acquisition of 0.46 acre by donation resulted in a total area of 1,051.09 acres.

Natchez Trace Parkway.—The acquisition of 899.782 acres by donation brought the total lands acquired for the parkway to 4,687.918 acres.

Old Philadelphia Customhouse.—By departmental order of May 26, 1939, this national historic site was established containing 0.786 acre.

Petersburg National Military Park.—The acquisition of 90.007 acres by purchase, donation, and transfer from the War Department resulted in this park having a total area of 2,031.455 acres.

Rocky Mountain National Park.—The acquisition of 1.832 acres by purchase brought the Federal lands within this park to 251,913.40 acres.

Santa Rosa Island National Monument.—By proclamation of May 17, 1939, this monument was established containing 9.500 acres.

Shenandoah National Park.—The acquisition of 2,099.86 acres by purchase and transfer from War Department resulted in a total area of 182,671.59 acres.

Walnut Canyon National Monument.—By proclamation of September 24, 1938, 919.46 acres were added to this monument resulting in a total area of 1,879.46 acres.

White Sands National Monument.—By proclamation of August 29, 1938, 17.95 acres were withdrawn from this monument, resulting in a total area of 143,227.47 acres. Acquisition of 604.93 acres by exchange brought the total Federal holdings in this monument to 131,572.82 acres.

CIVILIAN CONSERVATION CORPS COOPERATION IN PARK WORK

The fiscal year closed with 311 C. C. C. camps operating under technical supervision of the Service, compared with 294 on June 30, 1938. Camps in operation at the close of the year included 91 on continental national parks and 220 on State, county, and metropolitan park and recreation areas and recreational demonstration areas. During the year work was continued on a general program of conservation and recreational development involving construction of such facilities as

minor roads, trails, dams, cabins, and other simple park structures, water and sanitary systems, for both extended and day use of areas; and preservation of natural features of scenic value, general conservation of natural resources of water, soil, forest, and wildlife; restoration and preservation of areas of historical, geological, and archeological importance.

Work considered sufficient for present recreational needs was completed on 27 State, county, and metropolitan areas during the year, and the camps thereon transferred to other areas. Thirty-two new camps were established.

The Service cooperated with the United States Forest Service and other agencies in a general program of clean-up activities for fire protection and timber salvage necessitated by the floods and hurricane of September 1938, which wrought destruction in some of the New England States. A total of 212,000 man-days of C. C. C. enrollee labor was expended in this work.

In Territories and insular possessions 1,600 C. C. C. enrollees under the jurisdiction of the Service were engaged in conservation activities. In the Territory of Hawaii the enrolled strength of the corps was increased by 100 over the number of men authorized for the previous year. Of the total 900 authorized, 225 worked in Hawaii National Park and 675 were employed on lands under the jurisdiction of the Territorial government. In the Virgin Islands, C. C. C. work was initiated on the island of St. John, and continued on St. Thomas and St. Croix. Five hundred enrollees were engaged on these three islands at the close of the year. A 200-man C. C. C. camp at Mount McKinley National Park, Alaska, during the summer months worked primarily in the headquarters area and at McKinley Park Station.

Of importance to the State park C. C. C. program this year was the direct appeal to the Governors of the States by Director Fechner of the Civilian Conservation Corps for full compliance with the law requiring adequate maintenance, operation, and utilization of the areas developed by the Corps. Issued at a time when most of the legislatures were in session, this appeal was most effective in clarifying the position of the Federal Government with respect to its limitations in providing C. C. C. assistance to the States in the future.

RECREATIONAL DEMONSTRATION AREAS

In the recreational demonstration area program, 374,537 acres have been acquired and declarations of taking have been filed to acquire all remaining tracts for which funds were available.

Fire-protection plans have been perfected for each area, and utility groups and complete road and trail systems provided for most of them.

Sixty organized camps and many picnic areas and public bathing facilities have been completed or are nearly finished. There has been a 400 percent increase in the number of camper days of use and a heavy increase in public-use patronage. Swift Creek Recreational Demonstration Area, Va., alone had more than 100,000 visitors. In addition to the summer use of organized camps, there was a great increase in short-term camping throughout the year. The summer camps are operated by counties, community chest agencies, city boards of education, "Y" organizations, youth organizations, and similar agencies; and in South Carolina directly by the Division of State parks. A still greater variety of agencies used the camps week ends and holidays.

Legislation was introduced in Congress to authorize the Secretary of the Interior to convey or lease these areas to the States or the political subdivision thereof without a consideration when the grantees or lessees are adequately prepared to administer, operate, and maintain them.

NOTE.—This bill, H. R. 3959, was vetoed by President Roosevelt on August 11.

Studies reveal a great need for small group campgrounds providing only water and sanitation.

EMERGENCY RELIEF ACT PROJECTS

Ninety-four E. R. A. projects, consisting of 75 development and 19 "white-collar" projects, operated under supervision of the National Park Service.

The development projects, operated on Federally owned lands in 35 States, compare with 65 such projects in operation on June 30, 1938. They were carried on in 11 national parks, 12 national monuments, 2 national military parks, 2 national historical parks, 1 national historic site, 43 recreational demonstration areas, 1 beach erosion control project, and 1 national cemetery. Work on the recreational demonstration areas consisted principally of continued construction of organized camps, individual camp sites, picnic grounds, bathing facilities, and area operating facilities. The work on national park and monument areas consisted of the development of simple park facilities and the restoration and preservation of important natural and historic features. One unique E. R. A. project was the construction of 104 miles of brush fences and the planting of 980 acres of grass to arrest and prevent sand erosion by wind

and wave action on the more than 100 miles of beach in the proposed Cape Hatteras National Seashore in North Carolina.

The 19 "white-collar" projects were operated in 10 States and the District of Columbia, employing research workers, writers, guides, etc.

The Service received \$9,268,308 from the Emergency Relief Appropriations of 1939 for the operation of E. R. A. projects under its supervision, giving employment to a monthly average of 11,500 relief workers, of which 9,200 were employed locally and 2,300 were quartered in subsistence camps.

THE PARK, PARKWAY, AND RECREATIONAL AREA STUDY

In 45 States the Service continued its cooperation in the conduct of the study authorized by the act of June 23, 1936 (49 Stat. 1894). Preliminary reports on State-wide recreational plans have been completed in Alabama, Connecticut, Georgia, Idaho, Kentucky, Minnesota, New Jersey, North Dakota, Oklahoma, Oregon, South Carolina, Utah, and Wisconsin, and summary reports have been prepared in Florida and Missouri. A total of 23 State reports have been completed. Fourteen were published by the States.

These reports will serve as a guide for the development of parks and recreational areas by the States and as a basis for continued cooperation by the National Park Service. Work is being continued in these States toward preparation of more complete and comprehensive plans for integrated systems of recreational areas and facilities, based upon suggestions by the Service and State agencies.

In order to correlate the plans of the States and provide the framework for a national recreational plan, the Service has begun the preparation of the first edition of a report on a Nation-wide basis. Material in this report will be based in part upon the findings and recommendations of the State reports.

The proposal for a national Mississippi River Parkway, from the headwaters of the Mississippi in Itasca State Park, Minn., to the Gulf of Mexico, is a direct outgrowth of the study. This proposal is sponsored by 9 of the 10 States bordering the Mississippi River, and each has appointed a parkway planning committee. Through the efforts of these committees bills authorizing the Mississippi River Parkway were introduced in both Houses of Congress. Although the Service favors these bills in general, it is believed that definite action should await the development of a national plan for parkways.

During the year the Service continued to assist the States and their civil divisions in establishing and improving the functioning of their park systems. This involved consultation service, research, demonstration, and exchange of information relative to legislation, financing,

personnel requirements, and area and system administration, in relation to problems of maintenance, area protection, and the organization of recreational programs.

A comparative study of State park legislation was made and published in the 1938 Yearbook—Park and Recreation Progress, issued by the Service. A study of fees and charges is being compiled which is a consensus of experience of State and local park and recreational authorities in relation to this subject.

ACCOMMODATIONS FURNISHED BY PARK OPERATORS

Increased attention was given to the study of rates charged the public for accommodations furnished by private capital in national parks and monuments, an analysis which may lead to future adjustments in rate schedules.

It was impossible to secure permanent personnel to carry on these important rate studies, but work was accomplished by part-time, temporary, and emergency employees, and an E. R. A. "white-collar" project was established near the end of the fiscal year to continue the work.

While considerable thought has been given to the acquisition and operation of Government-owned facilities, the old, established policy under which concessions are granted to private interests for the establishment and operation of accommodations for the public was continued and further developed during the 1938 season. Proposed legislation affecting this policy, considered by the Congress during the fiscal year, included a bill to authorize the acquisition and operation by the Government of concessionaires' facilities throughout the park system. This bill was before the House Committee on Public Lands at the close of the fiscal year. Other bills were introduced for the purchasing of accommodation facilities in certain areas only, such as Mount Rainier, Olympic, and Mount McKinley National Parks, but they did not become law.

Government-built and Government-owned facilities at Bandelier National Monument were opened to the public during May 1939, the concession contract going to Mrs. Evelyn Cecil Frey, who had furnished accommodations in the area for many years prior to the establishment of the national monument. This is the first distinct step in the policy of the Government's construction of new facilities in national parks for operation by private concessionnaires. While there have been many Government-owned facilities in national parks and monuments heretofore utilized for accommodation of the public, these facilities had all been acquired only incidentally in land purchases or similar transactions.

In addition to the Bandelier concession contract, additional long-term concession contracts were granted to Emery C. Kolb for opera-

tions on the South Rim of Grand Canyon National Park; the Hale Bathhouse at Hot Springs National Park; and the Sutton Lines, Inc., for boat transportation and lodge accommodations at Fort Jefferson National Monument; and for ferry service between the Battery in New York City and the Statue of Liberty National Monument.

Shortly before the close of the fiscal year, 17 new cabins, with a total of 35 rooms of minimum-priced housing accommodations, were opened to the public at Mammoth Cave National Park for operation by the Mammoth Cave Operating Committee.

The Yellowstone Park Co., general operator in Yellowstone National Park, joined the Yosemite Park & Curry Co., of Yosemite National Park in a practical effort to design a satisfactory minimum cost prefabricated housing unit. The plans for the unit at Yellowstone were approved by the Service in May as part of a carefully worked out program to improve the general lay-out, appearance, and facilities in all cabins of that park. The first area to be revamped is Old Faithful.

Efforts were made during the year to furnish boat transportation service between Isle Royale and Houghton, Mich. An annual permit to cover expected service during the 1939 summer season, with a tentative arrangement for the continuation of such service thereafter, was made, but the permittee was unable to consummate the necessary arrangements and the permit was canceled. Invitations for bids were contemplated near the close of the year in the hope that some concern would be interested in providing this service.

Invitations for bids were extended to the general public on March 1, 1939, for the operations of meals, refreshments, and other small services at the Painted Desert Inn in Petrified Forest National Monument. The bids were due to be opened on April 3 but no bids were received. A further study is being given this matter with a view to securing a satisfactory operator.

SANITATION AND SAFETY PRECAUTIONS

Cooperating with the engineers of the National Park Service, sanitary engineers of the Public Health Service of the Treasury Department worked throughout the year to protect the health of the millions of visitors and thousands of employees of the Service's parks and monuments. Special attention was given to the provision of adequate supplies of pure water and the proper disposal of sewage, with many plans and designs of new facilities and improvements to old being reviewed and approved.

Swimming pools under the jurisdiction of the National Capital Parks were inspected and sampled for bacteriological examination at weekly intervals throughout the summer season. Inspections were

made also of the restaurants, tourist camp, and four camp units in the Chopawamsic recreational demonstration project.

Plans covering designs for sewerage systems were prepared for the following areas: Acadia National Park, Sieur de Monts Spring area, Seawall campground, and Thunder Hole; Mammoth Cave National Park, key area; Shenandoah National Park, Lewis Mountain cabin area, checking station, and rangers' quarters; Isle Royale National Park Project, Mott Island, Rock Harbor, and Washington Island; Fort Jefferson National Monument; Grand Canyon National Park, the North Rim; Glacier National Park, Many Glacier area; Lassen Volcanic National Park; Yellowstone National Park, the Thumb; Yosemite National Park, Tuolumne Meadows; Wind Cave National Park; and Boulder Dam National Recreational Area.

Plans were also submitted for improvements to the valley treatment plant in Yosemite.

Assistance was given in plans for developing water-supply systems at Colonial National Historical Park, Isle Royale National Park project, Fort Jefferson National Monument, Gettysburg National Military Park, Great Smoky Mountains National Park, Yellowstone (at the Canyon, Fishing Bridge, Lake and Thumb areas), and data were furnished for improvements to supply systems in the Yosemite, Rocky Mountain, Grand Teton, Mount Rainer, Lassen, and Mesa Verde National Parks.

Plans, bill of materials, and specifications were prepared for garbage incinerators to be constructed in Sequoia, Rocky Mountain, Glacier, Grand Teton, and Mesa Verde.

In addition to the safeguarding of health through inspection of sanitary conditions and facilities, the Service has worked to protect the public and its employees from accidents and to safeguard property against loss by fire. Safe-practice standards have been prepared for employees' use in working with machines, and first-aid training has been given to Service personnel through cooperation with the American Red Cross.

The Service has been active in the leadership of the Federal Interdepartmental Safety Council, an official advisory agency in matters relating to safety of all Federal employees.

MAINTENANCE OF FEDERAL BUILDINGS

At the close of the fiscal year, the activities of the Service's Branch of Buildings Management were transferred to the Federal Works Agency, in accordance with the President's Reorganization Plan No. 1. Between the time functions of buildings management were first placed under the Department of the Interior, in 1933, and this present transfer, the branch has grown in size and greatly extended its

scope. In 1933 the unit operated 45 buildings and 5 memorials in Washington, D. C. On July 1, 1939, at the time of the transfer, it was the largest organization of its kind in any one city of the United States, operating 128 buildings and 7 memorials and monuments in the National Capital and 14 Federal buildings in other parts of the country.

The National Park Service, through this branch, was responsible, during the past fiscal year, for the maintenance, operation, and protection of 21,917,843 square feet of floor space in the District of Columbia, of which 18,499,767 gross square feet were in 48 Government-owned buildings and 3,418,076 were in 80 privately owned buildings rented by the Government.

The only building in the District of Columbia acquired during the year was the War Department Annex (formerly known as Corcoran Courts Apartments), located at 401 Twenty-third Street, NW., which was purchased by the Treasury Department and turned over to the Service on October 1. Its remodeling was one of the major projects of the year. Funds were provided for this in the second deficiency bill, and approximately \$170,000 expended. Three new buildings in other cities—the United States Courthouse in Hattiesburg, Miss., the National Park Service Regional Headquarters Building in Santa Fe, N. Mex., and the Forest Service Building in Russellville, Ark., were taken over toward the close of the year for maintenance and operation.

With funds provided for repairs and improvements necessary in the maintenance of buildings, the Service was able during the year to complete a variety of projects in the State Department, Internal Revenue, Navy and Munitions, and the Arlington buildings, and in the Central Heating Plant.

Service of the heating plant was extended to the War Department Annex during the year, and the addition of this building increased the potential connected load by 3,500 pounds of steam per hour. Owing to the mild winter, only 94,434 tons of coal were consumed at the plant, the total steam generated being 2,051,140,000 pounds.

Operation of guard and elevator conductor schools was continued, and training courses were inaugurated for operating engineers and foremen of laborers. Instructions included fire fighting, safety practices, and, for the engineers, operation of air-conditioning systems.

Preservation of the stonework of buildings has been given considerable attention, and 12 stonemasons were employed during the year.

SPACE CONTROL

At the close of the fiscal year, space aggregating 15,596,688 net square feet was occupied by Government agencies in 121 Government-

owned buildings in the District of Columbia, housing 82,610 employees, under authorization from the National Park Service—the Service being responsible for allocation and proper utilization of space in nearly all of the Federal buildings in the District. Also, a total of 3,836,820 net square feet of space in 146 privately owned buildings, housing 27,710 employees, was being leased at an annual rental of \$3,583,931.11. This makes a total of 19,433,508 square feet of space occupied by 110,320 employees in 267 buildings.

Thirty-five changes in space allocations in Government buildings were approved, and 944 moves accomplished. The major move was that of the remaining War Department offices from the State Department to the Munitions Building, and of certain other War Department offices from the Munitions Building to the remodeled War Department Annex.

CONCLUSION

Two major problems face the Service in the years immediately to come. One is to round out the Federal park system by the inclusion of those areas whose highest value is that of conservation or recreation. There still remain a few scenic wildernesses, such as the Kings Canyon, referred to earlier in this report, which by their superb natural qualities merit national park status, and the protection it engenders. There also remain to be included places, both sites and structures, that were the locale of some of the most stirring and far-reaching events in our colonial and national life; and also of archeological remains that tell of prehistoric life on this continent. Before the wilderness is violated or the historic shrine desecrated, the protection of the Federal Government should be given to all such areas of truly national significance.

The second major problem is that of personnel. In its 1938 annual report, the Service stressed the urgency of obtaining adequate basic personnel to carry forward the mandate laid upon it to protect the parks and administer them for the benefit and enjoyment of the public. Since 1933 most of the new work entailed through consolidation of Federal park activities and the addition of new areas and new functions, has been handled through emergency personnel available to the Service for a limited and uncertain period of time. At the close of 1938 contraction of the emergency personnel already had been under way for 2 years. At the close of the 1939 fiscal year, word came of two more drastic reductions in administrative positions, one in Civilian Conservation Corps supervisory personnel and the other in that of the Emergency Relief projects assigned to the Service. Many of the cuts in personnel were immediately effective, while in some cases a year was given in which to reduce the number of employees.

Not only must the work of the Service of necessity suffer from shortage of experienced personnel under such conditions, but a serious decline in morale is bound to occur from these repeated and often unheralded reductions in staff. Moreover, the priceless natural and historic resources placed under the protection of the National Park Service will suffer if an adequate protective and administrative force is not provided. In addition, the traveling public is entitled to receive information on the Federal parks when traveling in them and when planning trips or studying them. Unless consideration is given to the proper manning of the various services maintained for the public—which was cut heaviest in the recent reductions—the Service will be justly open to criticism.

Replacement of the remaining temporary personnel by permanent civil-service employees, with the cooperation of the Bureau of the Budget and of Congress, is the only logical and satisfactory solution of this hampering and morale-destroying condition.

TABLE 1.—Holdings Acquired for National Park and Monument Purposes

Federal park system	Holdings acquired from July 1, 1938, through June 30, 1939						Total holdings acquired through June 30, 1939, in acres
	Holdings acquired by purchase			Holdings acquired otherwise than by purchase		Total acquired in acres	
	Government funds	Donated funds	Area in acres	How acquired	Area in acres		
Acadia National Park.....	\$2,612.50		49.150	Donation.....	408.880	408.880	16,522.490
Ackia Battleground National Monument.....				Transfer.....	49.150	49.150	963.930
Appomattox National Battlefield Site ?				Donation.....	963.930	963.930	
Badlands National Monument.....	111,802.10		40,231.560	Exchange.....	1,395.790	51,323.250	51,323.250
Blue Ridge Parkway.....	115,103.02		10,605.900	Donation.....	9,700.900	18,151.880	22,577.270
Boulder Dam National Recreational Area.....				do.....	7,545.980	15.930	34.760
Chickamauga and Chattanooga National Military Park.....				do.....	18.830	3.750	8,629.212
Colonial National Historical Park.....				do.....	3.750	6,325.386	6,332.962
Federal Hall Memorial.....				Transfer.....	.230	.487	6,325.616
Fort Laramie National Monument.....				do.....	214.410	214.410	214.410
Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park.....				do.....	13.340	13.340	2,230.977
Gettysburg National Military Park.....	15,172.60			do.....	.064	.064	2,392.009
Glacier National Park.....			63.030	Exchange.....	63.030	4,379.004	4,442.034
Grand Canyon National Monument.....				do.....	852.730	14,551.810	15,404.540
Grand Canyon National Park.....				do.....	436.020	74,965.310	75,401.330
Great Smoky Mountains National Park.....	22,153.53		904.050	Donation.....	770.665	437,802.650	439,277.365
Guilford Courthouse National Military Park.....				do.....	9.900	136.844	146.744
Homestead National Monument of America.....	18,000.00		160.820	do.....	160.820	160.820	160.820
Hopewell Village National Historic Site.....				Transfer.....	213.696	213.696	213.696
Hot Springs National Park.....	1,326.00		330	do.....	330	85.965	86.295
Isle Royale National Park Project.....	94,294.05		2,707.090	Donation.....	112.880	102,556.640	105,376.520
Kennecaw Mountain National Battlefield Park.....	38,997.54		930.000	do.....	930.000	617.930	1,577.930
Mammoth Cave National Park.....	19,435.00		615.600	Donation.....	1,429.190	38,441.590	40,486.380
Mount Rainier National Park.....	30,000.00		18.200	do.....	18.200	18.200	18.200
Morristown National Historical Park.....				Donation.....	.460	1,050.630	1,051.090
Natchez Trace Parkway.....				Donation.....	899.782	3,788.136	4,087.918
Old Philadelphia Customhouse.....				Transfer.....	.786	.786	.786
Petersburg National Military Park.....	600.00		3.340	Donation.....	30.257	1,959.628	2,031.455
Pinnacles National Monument 1.....	6,000.00		640.000	Transfer.....	56.380	640.000	640.000
Rocky Mountain National Park.....	150.00		1,832	do.....	1.832	5,214.568	5,216.400
Shenandoah National Park.....	7,766.25	\$14,624.00	1,122.360	Transfer.....	977.500	2,099.860	182,671.590
Tuzigoot National Monument 2.....				Donation.....	42.665	42.665	42.665

TABLE 1.—Holdings Acquired for National Park and Monument Purposes

Federal park system	Holdings acquired from July 1, 1938, through June 30, 1939						Total hold- ings acquired through June 30, 1939, in acres	
	Holdings acquired by purchase			Holdings acquired otherwise than by purchase		Total acquired in acres		
	Government funds	Donated funds	Area in acres	How acquired	Area in acres			
White Sands National Monument.....				Exchange.....	604 930	604 930	3 646 020	4 250 950
Yosemite National Park 1.....	1,498,500.00		6,977.860			6,977.860	27,844.880	34,822.740
Acres acquired in other areas prior to July 1, 1938.....							148,477.635	
Total.....	1,981,912.89	14,624.00	65,031.032		26,704.462	91,735.494	1,086,039.136	1,029,280.815
Grand total.....								1,177,774.630

¹ Outside.² Not established.

TABLE 2.—Appropriations for Administration, Protection, and Maintenance, Expenditures Therefrom, and Revenues, Fiscal Year 1939

Name of Park	Appropriated	Expenditures and obligations	Revenues received
Acadia.....	\$49,700	\$49,044.09	\$214.72
Bryce Canyon.....	12,250	12,095.33	.....
Carlsbad Caverns.....	100,300	92,380.58	273,856.03
Crater Lake.....	83,615	83,474.92	48,338.23
General Grant.....	20,960	20,898.34	15,123.35
Glacier.....	234,920	242,209.27	39,430.85
Grand Canyon.....	123,630	119,854.81	103,952.50
Grand Teton.....	31,380	31,377.69	1,593.70
Great Smoky Mountains.....	86,350	84,642.61	3,574.67
Hawaii.....	56,400	56,148.23	663.45
Hot Springs.....	73,530	73,313.03	38,554.20
Lassen Volcanic.....	50,300	49,924.63	16,774.61
Mammoth Cave.....	.....	.....	786.82
Mesa Verde.....	55,290	56,348.44	9,074.83
Mount McKinley.....	28,770	28,507.72	.....
Mount Rainier.....	176,555	178,414.84	49,363.50
National Capital Parks:			
United States.....	227,000	222,997.53	2,883.70
District of Columbia.....	925,280	917,203.77	23,605.02
Olympic.....	(2)	.....	.....
Platt.....	19,325	19,193.90	114.57
Rocky Mountain.....	88,950	95,928.87	11,438.60
Sequoia.....	133,935	131,773.30	60,694.28
Shenandoah.....	68,900	69,708.78	13,683.10
Wind Cave.....	18,720	19,790.85	10,613.94
Yellowstone.....	447,840	447,060.21	413,522.84
Yosemite.....	311,920	311,463.57	301,845.36
Zion.....	43,330	45,692.25	41,250.72
National historical parks and monuments.....	146,610	143,626.68	3,276.06
National monuments.....	216,920	218,379.99	8,970.12
El Morro National Monument.....	4,000	3,211.13	.....
National military parks, battlefields, monuments, and cemeteries.....	342,140	336,851.12	27,971.15
Boulder Dam National Recreational Area.....	87,840	87,613.78	906.05
National Park Service.....	218,540	221,091.00	232.13
Regional offices.....	34,000	32,926.97	681.63
Public buildings and grounds.....	8,090,892	8,984,104.66	15,375.79
Public buildings and grounds, deficiency.....	375,000	.....	.....
General expenses, National Park Service.....	28,500	27,522.93	.....
Forest protection and fire prevention.....	110,000	94,095.96	.....
Emergency reconstruction and fighting forest fires.....	40,000	26,649.87	.....
Construction of roads and trails.....	15,991,120	5,512,251.84	.....
B ue Ridge and Natchez Trace Parkways.....	17,000,000	2,667,284.00	910.54
Historic sites and buildings.....	12,000	11,683.03	.....
Investigation and purchase of water rights.....	50,000	41,602.09	.....
Miscellaneous.....	.....	.....	28,056.64
Total.....	26,216,712	21,868,342.61	1,567,333.70

1 Available until expended.

2 Included in national monuments.

TABLE 3.—Summary of Appropriations for the Administration, Protection, and Improvement of Areas Under the Jurisdiction of the National Park Service, Together With the Revenues Received, for the Fiscal Years 1917 ¹ to 1939, Inclusive

Year	Department	Appropriation		Revenues
1917	Interior Department.....	\$537,366.67	\$784,566.67	\$180,652.30
	War Department.....	247,200.00		
1918	Interior Department.....	530,680.00	748,180.00	² 217,330.55
	War Department.....	217,500.00		
1919	Interior Department.....	963,105.00	1,013,105.00	196,678.03
	War Department.....	50,000.00		
1920	.....	907,070.76	907,070.76	316,877.96
1921	.....	1,058,969.16	1,058,969.16	396,928.27
1922	.....	1,433,220.00	1,433,220.00	432,964.89
1923	.....	1,446,520.00	1,446,520.00	513,706.36
1924	.....	1,892,601.00	1,892,601.00	663,886.32
1925	.....	3,027,657.00	3,027,657.00	670,920.98
1926	.....	3,258,409.00	3,258,409.00	826,454.17
1927	.....	3,698,920.00	3,698,920.00	703,849.60
1928	.....	4,889,685.00	4,889,685.00	808,255.81
1929	.....	4,754,015.00	4,754,015.00	849,272.95
1930	.....	7,813,817.18	7,813,817.18	1,015,740.56
1931	.....	12,113,435.00	12,113,435.00	940,364.79
1932	.....	12,831,250.00	12,831,250.00	820,654.19
1933	.....	10,640,620.00	10,640,620.00	628,182.06
1933-35	.....	53,402,249.00	53,402,249.00	.....
1934	.....	10,983,089.00	10,983,089.00	731,331.80
1935	.....	12,461,513.00	12,461,513.00	907,189.96
1936	.....	16,686,090.00	16,686,090.00	1,136,533.68
1937	.....	18,190,490.00	18,190,490.00	1,398,691.66
1938	.....	23,333,525.29	23,333,525.29	1,504,561.84
1939	.....	26,216,712.00	26,216,712.00	1,567,333.70

¹ For summary of appropriations and revenues prior to 1917, see 1920 Annual Report, p. 359.

² The revenues from the various national parks were expendable during the years 1904 to 1918, inclusive, with the exception of those received from Crater Lake, Mesa Verde, and Rocky Mountain National Parks, the revenues from which were turned into the Treasury to the credit of miscellaneous receipts.

TABLE 4.—Forest-Fire Statistics, 10-Year Record, Jan. 1, 1929 to Dec. 31, 1938

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	Grand total	10-year average
Fire occurrence by size:												
Class A fires (¼ acre or less)	121	102	193	125	176	205	246	311	228	253	1,960	196
Class B fires (between ¼ acre and 10 acres)	35	45	63	61	59	108	150	302	114	124	1,061	106
Class C fires (over 10 acres)	20	13	64	35	42	66	41	120	45	39	485	48
Total Class A, B, and C fires	176	160	320	221	277	379	437	733	387	416	3,506	350
Fire occurrence by causes:												
Campfires	21	25	58	26	28	23	32	26	28	28	295	29
Smokers	54	50	85	62	78	115	119	171	121	125	980	98
Debris burning	13	11	56	27	34	35	43	72	31	37	349	35
Incendiary	11	2	45	24	21	51	90	247	53	84	628	63
Lumbering	1				1	2	2	3	1	2	12	1
Railroads	9			1	3	1	4	4	2	7	31	3
Miscellaneous	10	13	15	16	14	24	30	32	23	20	197	20
Total man-caused	109	101	259	156	179	251	320	555	259	303	2,492	249
Total lightning	67	59	61	65	98	128	117	178	128	113	1,014	101
Grand total	176	160	320	221	277	379	437	733	387	416	3,506	350
Total number of park visitors:	3,248,204	3,246,656	3,544,856	3,754,596	3,481,590	6,337,206	7,676,490	9,929,432	11,635,181	13,176,619	66,030,890	6,603,089
Number of visitors per fire started by campers and smokers	49,973	43,288	24,789	42,666	32,845	45,921	50,838	50,403	78,359	86,121	505,203	50,520
Total cost of fire fighting (exclusive of C. C. C.)	\$146,900	\$28,843	\$176,855	\$19,199	\$23,959	\$33,420	\$37,494	\$92,373	\$4,944	\$2,297	\$566,284	\$56,628
C. C. C. man-days contributed						44,339	29,326	30,047	7,417	5,293	116,422	11,642
Area burned inside parks:												
Fires	55,040	3,248	23,313	4,181	4,777	4,545	1,861	11,847	688	344	109,844	10,984
Brush	529	407	2,877	182	219	2,101	498	220	13	9	7,055	706
Grass	138	687	1,346	180	116	550	343	3,974	871	926	9,131	913
Total	55,707	4,342	27,536	4,543	5,112	7,196	2,702	16,041	1,572	1,279	126,030	12,603
Average acreage per fire	315	27	86	20	18	18	6	21	4	3	518	152
Total area needing protection	6,238,500	6,241,074	6,407,048	6,502,074	6,902,319	7,451,060	7,451,060	7,648,462	7,858,914	8,212,978	70,913,489	7,091,349
Area burned per million acres protected	8,930	695	4,297	698	741	966	362	2,097	200	155	19,141	1,914

* Exclusive of visitors to miscellaneous memorials and areas with little or no fire hazard.

TABLE 5.—Interpretational Activities of the National Park Service

National parks and monuments	Guided trips		Lectures		At-tended exhibits	Unat-tended exhib-its	Total contacts	Total park visitors
	Num-ber	Attend-ance	Num-ber	Attend-ance				
Acadia.....	101	4,372	72	12,814	50,370	-----	67,556	414,911
Bryce Canyon.....	218	17,360	291	42,506	-----	-----	59,866	102,531
Carlsbad Caverns.....	-----	202,005	-----	30,648	-----	-----	232,653	202,005
Crater Lake.....	181	2,859	516	31,287	92,756	700	127,602	203,284
General Grant.....	40	1,308	47	20,765	20,192	2,286	44,551	115,580
Glacier.....	816	19,694	432	31,539	65,011	103,875	220,119	158,534
Grand Canyon.....	472	31,893	1,499	146,274	169,794	4,422	352,383	336,393
Grand Teton.....	68	1,947	85	14,966	42,490	75	59,478	122,955
Hawaii.....	276	8,476	202	13,545	26,748	90,999	139,768	176,061
Hot Springs.....	2	131	16	633	32,342	1,050	34,156	162,241
Lassen Volcanic.....	189	7,864	164	24,445	29,027	4,150	65,486	93,181
Mesa Verde.....	1,297	41,042	367	19,421	46,905	29,515	136,883	32,784
Mount McKinley.....	49	773	50	1,546	646	-----	2,965	1,672
Mount Rainier.....	335	6,107	742	30,657	258,503	-----	295,267	368,854
National Capital Parks.....	151	7,411	137	41,463	-----	7,450	56,324	-----
Rocky Mountain.....	250	6,906	363	27,107	86,293	2,510	122,816	643,879
Sequoia.....	148	7,133	563	144,320	29,185	24,000	204,638	263,399
Shenandoah.....	29	736	49	3,835	238	13,750	18,559	897,501
Wind Cave.....	-----	19,114	-----	-----	-----	-----	19,114	19,106
Yellowstone.....	1,630	92,554	2,134	587,878	677,415	237,850	1,595,697	465,727
Yosemite.....	672	32,918	2,189	490,751	333,953	24,500	882,122	457,013
Zion.....	240	15,335	582	81,758	566	-----	97,659	151,352
Boulder Dam.....	136	1,845	761	31,490	43,749	-----	77,084	546,384
Great Smoky Mountains.....	26	384	21	1,565	80	-----	2,029	719,432
Mammoth Cave.....	-----	71,231	-----	-----	-----	-----	71,231	120,505
Southwestern monuments.....	17,204	93,781	10,936	68,328	10,549	12,982	185,640	296,977
Cedar Breaks.....	13	59	133	2,607	9,563	-----	12,229	17,327
Death Valley.....	4	214	195	12,000	2,712	150	15,076	59,552
Dinosaur.....	1,380	9,429	832	9,431	1,622	625	21,107	10,057
Lava Beds.....	2,645	13,018	14	695	28,353	20,993	63,059	36,199
Lehman Caves.....	495	3,148	-----	-----	2	-----	3,150	3,910
Muir Woods.....	1,701	23,145	3	165	-----	53,287	76,597	126,727
Oregon Caves.....	750	12,000	743	14,777	500	800	28,077	49,786
Petrified Forest.....	127	3,188	705	16,908	126,672	-----	146,768	213,242
Scotts Bluff.....	-----	-----	24	325	24,225	13,440	37,990	93,121
Timpanogos Cave.....	1,198	13,528	9	998	3,194	-----	17,720	13,494
Total.....	32,843	772,908	24,876	1,957,447	2,213,655	649,409	5,593,419	7,735,676

Percentage of park visitors served by the educational activities, 72 percent.

TABLE 6.—Statement Showing Work Accomplished at Civilian Conservation Corps Camps Under the Jurisdiction of the National Park Service July 1, 1938, to June 30, 1939

Item	Unit	Total work accomplished July 1, 1938-June 30, 1939			
		New construction		Maintenance	
		National parks and monuments	State parks	Combined total national parks and State parks	National parks and monuments
Bridges:					
Foot and horse.....	Number.....	1	47	48	8
Vehicle.....	Number.....	5	43	48	96
Barns.....	Number.....	-----	6	6	1
Bathhouses.....	Number.....	3	14	17	-----
Cabins, overnight.....	Number.....	-----	128	128	-----
Combination buildings.....	Number.....	-----	35	35	-----
Dwellings.....	Number.....	61	27	88	187
Equipment and supply storage houses.....	Number.....	7	70	77	20
Garages.....	Number.....	29	31	60	5
Latrines and toilets.....	Number.....	44	133	177	92
Lodges and museums.....	Number.....	4	11	15	7
Lookout houses.....	Number.....	-----	1	1	2
Lookout towers.....	Number.....	2	7	9	3
Shelters.....	Number.....	8	58	66	2

TABLE 6.—Statement Showing Work Accomplished at Civilian Conservation Corps Camps Under the Jurisdiction of the National Park Service July 1, 1938, to June 30, 1939—Continued

Item	Unit	Total work accomplished July 1, 1938-June 30, 1939			
		New construction		Maintenance	
		National parks and monuments	State parks	Combined total national parks and State parks	National parks and monuments
Other buildings.....	Number.....	35	132	167	454
Cribbing, including filling.....	Cubic yards.....	1,650	8,278	9,928	-----
Impounding and large diversion dams.....	Number.....	2	22	24	-----
Fences.....	Rods.....	15,172.3	29,337.5	44,509.8	13,660.4
Guard rails.....	Rods.....	2,358	10,983.1	13,341.1	1,268
Levees, dykes, jetties and groins.....	Cubic yards.....	-----	118,775	118,775	-----
Power lines.....	Miles.....	4.6	76	80.6	46.4
Incinerators.....	Number.....	2	30	32	2
Sewage and waste-disposal systems.....	Number.....	27	226	253	65
Telephone lines.....	Miles.....	239.8	138.3	378.1	1,442
Fountains, drinking.....	Number.....	7	148	155	-----
Pipe or tile lines.....	Linear feet.....	149,934	350,199	500,133	13,366
Storage facilities (omit last 000).....	Gallons.....	3,149	709.3	3,858.3	-----
Wells, including pumps and pump-houses.....	Number.....	6	60	66	-----
Miscellaneous.....	Number.....	9	15	24	3
Camp stoves or fireplaces.....	Number.....	181	1,677	1,858	-----
Cattle guards.....	Number.....	2	14	16	-----
Corrals.....	Number.....	4	2	6	-----
Seats.....	Number.....	289	1,851	2,170	22
Signs, marks, and monuments.....	Number.....	5,371	4,241	9,612	1,801
Stone walls.....	Rods.....	291.9	1,532.3	1,824.2	1,647
Table and bench combination.....	Number.....	446	3,735	4,181	80
Tool boxes.....	Number.....	43	525	578	-----
Miscellaneous structures.....	Number.....	818	2,858	3,676	11
Radio stations.....	Number.....	5	-----	5	27
Springs.....	Number.....	19	20	39	-----
Small reservoirs.....	Number.....	10	8	18	9
Landing docks and piers.....	Number.....	2	36	38	1
Airplane landing fields.....	Number.....	-----	-----	-----	1
Truck trails or minor roads.....	Miles.....	147.9	333.4	481.3	2,728.5
Foot trails.....	Miles.....	47.5	143.4	190.9	251.5
Horse or stock trails.....	Miles.....	136	82.5	218.5	1,687.9
Stream and lake bank protection.....	Square yards.....	10,600	597,530	608,130	1,065
Bank sloping.....	Square yards.....	407,380	323,744	731,124	1,192,560
Check dams.....	Number.....	16	958	974	-----
Permanent.....	Number.....	2,524	314	2,838	-----
Temporary.....	Number.....	375,441	352,012	727,453	502,964
Seeding and sodding.....	Square yards.....	249,500	210,670	460,170	-----
Tree planting, gully.....	Square yards.....	4,029	11,963	15,992	2,047
Ditches, diversion.....	Linear feet.....	1.5	1.8	3.3	-----
Terracing.....	Miles.....	-----	1,430	1,480	-----
Channel construction.....	Linear feet.....	-----	2	2	-----
Outlet structures.....	Number.....	-----	-----	-----	-----
Planting, seed, or sod.....	Square yards.....	-----	128,008	128,008	-----
Wind-erosion area treated.....	Acres.....	-----	20.3	20.3	-----
Water spreaders (rock, brush, wire).....	Linear feet.....	-----	5,895	5,895	-----
Channels and levees—clearing.....	Square yards.....	81,025	147,479	228,504	-----
Reservoir, pond, and lake sites—clearing.....	Acres.....	-----	722.8	722.8	-----
Excavation channels, canals, and ditches:					
Earth.....	Cubic yards.....	68,618	648,331	717,249	-----
Rock.....	Cubic yards.....	-----	2,399	2,399	-----
Pipe and tile lines and conduits.....	Linear feet.....	10,567	39,920	50,487	-----
Rock or concrete—riprap.....	Square yards.....	12,738	58,259	70,997	-----
Brush or willows—riprap.....	Square yards.....	-----	7,000	7,000	2,500
Water-control structures other than dams.....	Number.....	26	338	364	-----
Field planting or seedling (trees).....	Acres.....	4,452.7	14,673.3	19,126	5,645.8
Forest stand improvement.....	Acres.....	-----	263	263	-----
Nurseries.....	Man-days.....	29,094	51,957	81,051	7,490
Tree seed collection, conifers (cones).....	Bushels.....	9	1,902	1,911	-----
Tree seed collection, hardwoods.....	Pounds.....	17,474	15,213	32,687	-----
Collection of tree seedlings.....	Number.....	-----	47,877	47,877	-----
Fighting forest fires.....	Man-days.....	13,310	37,364	50,674	-----
Firebreaks.....	Miles.....	11.7	139.1	150.8	78.9
Fire-hazard reduction:					
Roadside and trailside.....	Miles.....	231.5	283.2	514.7	-----
Other.....	Acres.....	4,961	21,205.8	26,166.8	-----
Fire suppression.....	Man-days.....	63,160	74,706	137,866	-----
Fire prevention.....	Man-days.....	834	3,538	4,372	-----

TABLE 6.—Statement Showing Work Accomplished at Civilian Conservation Corps Camps Under the Jurisdiction of the National Park Service July 1, 1938, to June 30, 1939—Continued

Item	Unit	Total work accomplished July 1, 1938-June 30, 1939			
		New construction		Maintenance	
		National parks and monuments	State parks	Combined total national parks and State parks	National parks and monuments
Tree and plant disease control.....	Acres.....	17,793.2	15,934.3	33,727.5	712
Tree insect pest control.....	Acres.....	14,075.7	50,222	64,297.7	4,076
Beach improvement.....	Acres.....	221	154.8	375.8	30
General clean-up.....	Acres.....	11	495	506	
Landscaping, undifferentiated.....	Acres.....	6,359.7	5,436.9	11,796.6	429.2
Moving and planting trees and shrubs.....	Number.....	222,387	1,285,792	1,508,179	383,196
Parking areas and parking overlooks.....	Square yards.....	33,277	717,056	750,333	1,262
Public camp-ground development.....	Acres.....	77.1	236.1	313.2	730.8
Public picnic ground development.....	Acres.....	3.8	638.2	642	216.5
Razing undesired structures and obliteration.....	Man-days.....	56,077	144,960	201,037	
Seed collection (other than tree).....	Pounds.....	13	1,740	1,753	
Seeding or sodding.....	Acres.....	304.1	973.8	1,277.9	3,212.4
Soil preparation (top soiling).....	Acres.....	329.1	1,070.3	1,399.4	
Vista or other selective cutting for effect.....	Acres.....	502.3	483.9	986.2	
Walks, concrete, gravel, cinder, etc.....	Linear feet.....	28,596	44,429	73,025	7,102
Elimination of livestock and predators.....	Number.....	2,880		2,880	
Fish-rearing ponds.....	Number.....	24	34	58	21
Food and cover planting and seeding.....	Acres.....	19	262.1	281.1	
Lake and pond development.....	Man-days.....	2,082	27,229	29,311	
Stocking fish.....	Number.....	1,425,489	112,700	1,538,189	
Stream development (wildlife).....	Miles.....	1.6	3	4.6	
Other wildlife activities.....	Man-days.....	14,019	4,398	18,417	
Wildlife feeding.....	Man-days.....		587	587	
Wildlife shelters.....	Number.....		18,729	18,729	
Education, guide, contact station work.....	Man-days.....	68,924	67,612	136,536	
Emergency work.....	Man-days.....	5,195	73,775	78,970	
Eradication of poisonous weed, or exotic plants.....	Acres.....	267.3	910.3	1,177.6	
Experimental plots.....	Number.....	14		14	19
Insect pest control.....	Acres.....		1,245	1,245	
Maps and models.....	Man-days.....	2,322	4,431	6,753	
Marking boundaries.....	Miles.....	123.9	73.3	197.2	
Mosquito control.....	Acres.....		1,097	1,097	
Preparation and transportation of materials.....	Man-days.....	179,237	340,704	519,941	
Reconnaissance and investigation:					
Archaeological.....	Man-days.....	8,817	12,822	21,639	
Other.....	Man-days.....	6,151	11,375	17,526	
Restoration of historic structures.....	Number.....	43	1,515	1,558	
Rodent and predatory animal control.....	Acres.....		45	45	
Surveys.....	Man-days.....	26,359	69,748	96,107	
Tree preservation.....	Man-days.....	12,438	19,596	32,034	
Equipment, repair, or construction.....	Man-days.....	1,325	2,380	3,705	
Hydraulic research.....	Man-days.....		472	472	
Warehousing.....	Man-days.....	3,578	5,193	8,771	
Unclassifiable.....	Man-days.....		232	232	

OFFICE OF THE SOLICITOR

Nathan R. Margold, *Solicitor*

DURING the fiscal year 1939 the Solicitor and the members of his staff were called upon to perform legal duties more widely varied, more extensive, more involved, and frequently more difficult than in preceding years.

The volume of legal work received in the immediate office of the Solicitor during the fiscal year 1939 is indicated by the following table:

Requests for formal Solicitor's opinions.....	483
Legislative matters.....	1, 090
Contracts.....	2, 725
Division of Investigations matters.....	56
Requests for land decisions in connection with appeals from the General Land Office.....	761
Board of Equitable Adjudication cases.....	1, 546
General Land Office matters.....	4, 008
Division of Grazing matters.....	198
Geological Survey matters.....	224
Bureau of Mines.....	122
Petroleum Conservation Division matters.....	26
War Minerals Relief cases.....	60
Indian Office matters.....	8, 271
Bureau of Reclamation matters.....	1, 045
National Park Service matters.....	814
Division of Territories matters.....	144
St. Elizabeths Hospital matters.....	16
Miscellaneous items.....	79
Total.....	21, 668

Disregarding changes in recording procedures, the numerical increase in the work of the Solicitor's immediate office during 1939 was 4.75 percent; adjusting for these changes, the numerical increase over 1938 was substantially in excess of that figure.

During the course of the fiscal year the Solicitor and members of his immediate staff were required to conduct, on behalf of the Government, the defense of a number of suits pending in the courts of the District of Columbia. These suits involved the legality of various official acts of the Secretary of the Interior.

In *United States ex rel. Roughton v. Ickes* (101 F. (2d) 248), the Court of Appeals construed and sustained the discretionary powers of the Secretary with respect to the issuance of oil and gas leases

under the Mineral Leasing Act; and in *Richardson v. Ickes* the District Court upheld the action of the Secretary in denying an application for a grant of oil and gas privileges without competitive bidding. In connection with this latter controversy the question of the Government's title to certain valuable oil lands off the coast of Louisiana was also presented. Another decision favorable to the position of the Government was rendered by the District Court in *Burley Irrigation District v. Ickes*, a suit attacking both the ownership of power facilities on reclamation projects by the United States and the power of the Secretary of the Interior to control the use of water thereon as between irrigation and power purposes. In *Glass v. Ickes and Holland* the District Court sustained the validity of a regulation prohibiting ex-employees of the Department from practicing as attorneys before its various bureaus and offices until two years after the termination of their employment; and in *Glass v. Ickes* the same tribunal dismissed a libel suit raising important questions as to the privileged character of public statements made in the performance of official duties. Appeals from the three last-mentioned decisions have been taken to the Court of Appeals.

Seven war minerals relief cases filed in the courts of the District of Columbia under the act of February 13, 1929 (45 Stat. 1166) were disposed of during the fiscal year through consent decrees or orders of dismissal. Twenty-two war minerals relief cases are still pending on the court dockets, in two of which appeals have been filed with the Court of Appeals.

Numerous civil and criminal actions arising out of or bearing upon departmental activities were pending in other courts during the fiscal year. The Solicitor and his staff assisted the officers of the Department of Justice in prosecuting or defending many of these proceedings.

Water-right and irrigation litigation presented many intricate issues. Decisions on Indian water rights favorable to positions contended for by the Department were rendered in the important cases of *United States v. Powers* (305 U. S. 527), *United States v. McIntyre* (101 F. (2d) 650), and *United States v. Walker River Irrigation District* (104 F. (2d) 334). In the first two cases the doctrine that a treaty establishing an Indian reservation impliedly reserves the waters of the reservation for the benefit of the Indians was reaffirmed and applied, and in the last case this doctrine was extended to reservations created by Executive order. The decision in *United States v. McIntyre* marked the successful termination of some 52 cases of about 7 years' standing dealing with Indian water rights. The original suit of *Nebraska v. Wyoming and Colorado*, pending in the Supreme Court throughout the year, has not yet been sub-

mitted for decision. Water rights of vital Federal importance are involved.

Various important decisions on Indian matters were rendered during the fiscal year. In *Minnesota v. United States* (305 U. S. 382), principles long contended for by the Department, namely, that suits brought by the States to condemn Indian lands under the act of March 3, 1901 (31 Stat. 1084), must be brought in the Federal courts, and that the United States must be made a party to the suit, were sustained. In *Glenn v. Lewis* (105 F. (2d) 398), restricted lands allotted to Indians of the Five Civilized Tribes were held to continue under restrictions while in the hands of heirs or devisees possessing one-half or more, but less than full, Indian blood. This decision confirmed an interpretation previously placed upon the law by the Department, under which substantial savings to the Indians have already been effected. In *United States v. Algoma Lumber Co.* (305 U. S. 415), and *United States v. Harris* (100 F. (2d) 268), important legal principles applicable to contracts for the sale of Indian timber were announced. Decisions favorable to the contentions of the Government were delivered in a number of other suits pertaining to Indian administration, including 18 suits involving trespass upon Navajo lands. Among the cases of importance pending at the end of the year was a suit presenting the fundamental question whether the United States has the constitutional right to condemn State-owned lands for the use of Indian tribes.

Oil and gas litigation required much attention during the year, particularly because of the large interests involved and the complexity of the issues presented. A number of major oil and gas controversies were passed upon by the courts, while others are still pending. Several of these have to do with the refusal of certain operators to comply with the Connally "Hot Oil" Act on the basis of claims that their operations are solely intrastate, while others pertain to the enforcement of that act in various particulars.

The rendition of formal opinions upon questions of law submitted to the Solicitor for official rulings, and the preparation of land decisions in connection with appeals from the General Land Office are important functions of the Solicitor's immediate office. The following table shows the extent and status of these activities during the fiscal year 1939:

	Solicitor's opinions	Land decisions
Pending July 1, 1938.....	144	170
Received during the year.....	483	761
Total.....	627	931
Disposed of during the year.....	443	577
Pending June 30, 1939.....	184	354

The legal work incident to the leasing of portions of the public domain for oil, gas, or mineral development, and to the granting of leases or permits for grazing activities in public-land areas, has required the handling of much legal detail and the solution of many new problems. The following figures, showing the number of lease transactions submitted to the immediate office of the Solicitor during the fiscal year, partially indicate the magnitude of this work:

Review of oil and gas leases issued, permits exchanged for prospecting leases, and so forth.....	1, 125
Review of coal permits, leases, and licenses issued, canceled, and so forth.....	163
Review of grazing leases executed under sec. 15 of the Taylor Grazing Act.....	2, 678

Forty-nine grazing appeals involving applications to the Secretary for a review of the action of the Division of Grazing in denying or modifying grazing privileges were also disposed of during the year, leaving 28 such appeals pending.

The tendency of Indian legal problems to grow in variety and complexity as the ramifications of Indian administration increase was noticeable throughout the fiscal year. Tribes which have established business organizations under the Indian Reorganization Act and its supplements are commencing to exercise the business powers provided for under their constitutions and charters, thereby widely extending the range of the legal problems which must be solved by the attorneys assigned to Indian matters in the immediate office of the Solicitor. Since Indian activity in the economic field is steadily enlarging, and since the tribes are commencing to utilize more fully their powers of self-government, a permanent increase in Indian legal work is to be expected.

The approval of titles to real estate in process of purchase or condemnation and the performance of other legal services in connection with land acquisition transactions required considerable attention during the course of the fiscal year. The number of title and related matters passed upon in the immediate office of the Solicitor was as follows:

Title examinations and reviews.....	529
Formal title opinions.....	118
Condemnation cases and miscellaneous items.....	983
Total.....	1, 624

A summary of the major types of legislative work performed by the Legislative Unit of the Solicitor's Office during the fiscal year 1939 indicates that the volume of legislative work handled was, on a conservative estimate, between 40 and 50 percent greater than the volume handled in 1938. All indications point to a further substantial increase in 1940.

Approximately one-fifth of the public laws and resolutions enacted at the first session of the Seventy-sixth Congress dealt with matters of concern to the Department of the Interior. Those of major importance are:

Public, No. 260: The Reclamation Project Act of 1939.

Public, No. 368: An act to provide for the establishment of the Chalmette National Historical Park in the State of Louisiana, and for other purposes.

Public, No. 173: An act to amend the Taylor Grazing Act.

Public No. 398: An act authorizing construction of water conservation and utilization projects in the Great Plains and arid and semiarid areas of the United States.

Public, No. 249: An act relating to the exchange of certain lands in the State of Oregon.

Public, No. 117: An act to provide for the common defense by acquiring stocks of strategic and critical materials, etc.

Public, No. 96: An act giving the consent and approval of Congress to the Rio Grande compact signed at Santa Fe, N. Mex., on March 18, 1938.

Public, No. 238: An act to provide for the distribution of the judgment fund of the Shoshone Tribe of the Wind River Reservation in Wyoming, and for other purposes.

Public, No. 325: An act providing for the disposition of certain Klamath Indian tribal funds.

Seventy-odd other statutes bearing upon departmental activities were enacted during the session.

During the fiscal year a wide variety of legal problems arising out of the administration of the public-land laws received the attention of the legal staff attached to the General Land Office. The total number of items passed upon was 38,826, a number estimated as being slightly in excess of the quantity handled during the preceding year. Institution of suit was recommended in 32 instances.

A considerable increase in the legal work of the General Land Office is expected to occur during the fiscal year 1940. One reason for this is that some 4,000 oil and gas prospecting permits are in process of transformation into leases. Another reason is the anticipated filing of numerous applications for the lease of lands covered by another 4,000 oil and gas prospecting permits, which are due to expire by the end of the present calendar year.

Geological Survey legal work increased from 1,661 items in 1938 to 2,271 items in 1939. Numerous legal documents pertaining to the leasing of the public domain for oil, gas, or mineral development, and to the conduct of drilling or other operations under such leases were drafted or reviewed. Twenty unit plans of operation involving over 360,000 acres of land, submitted pursuant to the acts of March 4, 1931 (46 Stat. 1523), and August 21, 1935 (49 Stat. 674), were approved. The administration of the unit plans approved during preceding years also presented a variety of legal problems, frequently of a complex character. Regulations and orders governing operations in

unitized areas were prepared. Legal problems incident to the sale of royalty oil belonging to the Government; to the preparation or review of cooperative agreements with States, municipalities, and other agencies; and to the obtaining of patent protection for the Government's interest in inventions made by employees of the Survey required considerable attention. Memoranda and briefs were prepared in connection with quasi-judicial proceedings affecting mineral lands.

The handling of legal work in the Office of Indian Affairs is divided between the Law Division and the Probate Division. A high degree of specialization in an extensive range of topics is required of Indian Office attorneys. The volume of work received in the Law Division at Washington is estimated as having been from 5 to 7 percent greater in 1939 than in 1938. Increases are also reported for various field offices.

Indian-tax matters may be cited as an example of the manifold legal problems requiring attention by the attorneys detailed to the Office of Indian Affairs. Questions concerning the applicability of State and Federal taxes to the Indians and their property are progressively increasing in difficulty and importance as taxing authorities seek to expand receipts. Numerous controversies and suits involving ad valorem real and personal property taxes, estate or inheritance taxes, gift taxes, license taxes, sales taxes, and other revenue measures are pending. More than 100 Federal and State tax cases involving Oklahoma Indians alone were considered during the fiscal year.

Indian probate matters are gradually enlarging in volume, with the result that the backlog of undisposed probate cases has grown to considerable proportions. Outside of the Five Civilized Tribes and the Osage Nation the number of estates probated increased from 1,793 in 1938 to 1,880 in 1939, while the number of estates awaiting probate at the end of the year increased from 1,836 in 1938 to 2,625 in 1939. More work of this character was on hand at the beginning of the fiscal year 1940 than can be disposed of during a full year with existing facilities.

The Legal Division of the Bureau of Reclamation during the fiscal year handled in its Washington and field offices more than 20,000 legal matters of a varied and often complex character. In line with the continuing expansion of Federal reclamation activities, the volume of work received was considerably in excess of that handled during any prior year.

Contracts drafted or reviewed during the fiscal year totaled approximately 6,550 in number and approximately \$113,000,000 in amount, as compared with about 4,450 contracts involving some \$64,000,000 reviewed or drafted during the preceding year. A considerable number

of the contracts handled dealt with the sale of power or the lease of power facilities on reclamation projects, while another important group dealt with the repayment of project construction costs by water users' associations. Land or right-of-way acquisitions for the several projects during the year necessitated the preparation of some 1,163 title opinions by field attorneys, while in the neighborhood of 4,000 legal opinions on a variety of topics were written in the Washington and field offices. In addition, water filings for various projects were prepared, special notices covering the operation and maintenance of projects were drafted, legal reports on proposed projects were written, leases were drafted and executed, purchases of lands and rights-of-way were negotiated and closed, transfers of water rights were arranged, the extent and character of rights-of-way were determined in specific instances, interdepartmental agreements and understandings were drafted, powers and duties of municipalities and irrigation or conservancy districts under their charters and the governing State statutes were determined. An important achievement was the settlement of 400 notes and warrants issued by the Verde River Irrigation and Power District.

The Reclamation Project Act of 1939 was introduced in Congress during the fiscal year and become law shortly after its close. This statute constitutes the most important reclamation legislation passed since the basic act of 1902. The principal objectives of the new measure are the establishment of equitable and economically sound bases for the repayment of construction charges by the users of project water, the readjustment of existing repayment contracts in accordance with these new standards, and the provision of appropriate criteria for determining the feasibility of proposed future projects.

The general legal work of the Bureau of Reclamation has for some time been undergoing a rapid increase in both volume and complexity. The principal underlying causes for this development are the substantial expansion of the construction program of the Bureau; the development of projects in settled areas such as the Central Valley in California, where the legal entanglements of water and other property rights are very great; and the enlarged scope of legislative activity with respect to the Bureau. Acquisition of rights-of-way, condemnation proceedings, adjudication of water rights, and contract drafting in connection with the Colorado-Big Thompson, Provo River, Humboldt, All-American Canal, Boulder Canyon, Parker Dam, Central Valley, Tucumcari, and Columbia Basin projects have contributed large items to the work load. The water-right problems arising in connection with the Central Valley project are widely recognized as the most difficult and complex ever to have arisen in California.

Varied and extensive legal services were rendered the National Park Service during the fiscal year through the office of the Chief Counsel of that Service. More than 22,000 individual items were handled. The total volume of work received in the course of the year is estimated to have surpassed by approximately 20 percent the total volume received during the preceding fiscal year, while the number of unfinished matters pending at the end of the year is estimated to have exceeded by approximately 15 percent the number pending at the beginning of the year.

Land acquisitions for park, monument, or other purposes imposed, in particular, a very heavy burden upon the legal staff of the National Park Service in 1939, and will continue to do so in 1940. The Jefferson National Expansion Memorial, Yosemite Sugar Pine, Chesapeake and Ohio Canal, Redwood Mountain, Isle Royale, Mammoth Cave, and Great Smoky Mountains acquisition projects required almost constant attention during the year, while among the important projects planned for 1940 are the Washington Coastal and Corridor, Grand Canyon, Great Smoky Mountains, Colonial Parkway, and Kennesaw Mountain acquisitions.

The principal activities of the Legal Division of the Puerto Rico Reconstruction Administration during the fiscal year 1939 and the volume of work handled over the course of the year are summarized in the following table:

	<i>Number of major matters</i>
Land acquisition transactions ¹ -----	1,329
Closed prior to end of year-----	979
Pending at end of year-----	350
Organization documents for 5 cooperatives-----	60
Contracts and leases-----	3,820
Construction contracts-----	13
Leases-----	96
Usufruct contracts-----	3,686
Miscellaneous contracts-----	25
Litigation-----	231
Suits to recover taxes-----	19
Ouster proceedings-----	42
Suits for specific performance of contracts to sell land-----	7
Proceedings to clear title to acquired lands-----	158
Miscellaneous suits-----	5
Formal opinions (many informal opinions and memoranda were also prepared)-----	13
Total-----	5,453

¹ These transactions involved the handling of 3,196 notarial deeds.

Expenses of the Legal Division for the fiscal year 1939 decreased more than 25 percent as compared with those for the preceding fiscal year, notwithstanding a 20 percent increase in the total expenditures of the Puerto Rico Reconstruction Administration.

Viewing the various branches of the Office of the Solicitor as a whole it is apparent that the fiscal year 1939 was marked by a distinct increase in the size and complexity of the tasks assigned to the Solicitor and his staff. Not only was the volume of business substantially larger than in former years, but also the questions presented were in many instances more intricate and involved than ever before. A number of factors indicating the probability of further growth in the volume and complexity of the legal work of the Department during the fiscal year 1940 have already been pointed out in connection with the discussion of particular topics. To these must be added the fact that the reorganization plans which became effective on July 1, 1939, transferred a number of additional offices and functions to the Department, and thereby greatly enlarged the scope of the tasks committed to the Office of the Solicitor. If present standards of performance are to be maintained, it is imperative that legal personnel and funds be increased.

DIVISION OF INVESTIGATIONS

B. B. Smith, *Director*

THE number of employees in the Division of Investigations as of June 30, 1939, was 143, of which number 111 were paid from the regular appropriation and 32 were paid from emergency funds. The Division consists of a central office and five regional offices located at San Francisco, Calif.; Billings, Mont.; Salt Lake City, Utah; Albuquerque, N. Mex.; and Washington, D. C.

On July 1, 1938, there were pending 11,914 cases for investigation. During the year 8,257 new cases were received and 11,264 were closed. At the end of the year there remained uninvestigated 8,907 cases, which represented a net reduction for the year of over 3,000 in the pending cases.

At some time during the year the Division was called upon to make investigations for each bureau and office within the Department. The variety of these requests demanded the services of special agents with expert training and experience in law, accounting, engineering, timber cruising, land appraisals, and range control.

To pave the way for the issuance of term leases instead of temporary 1-year leases, a great amount of time was devoted to the investigation of applications for leasing isolated and disconnected tracts of the public domain, as provided for under section 15 of the Taylor Grazing Act. A total of 3,512 applications for lease were investigated and reported during the year. While it is necessary in these cases that basic information be obtained relative to the qualifications of the applicants, number of head of livestock which the lands will support, rental fees, stock-watering facilities, and numerous other facts, the most important element is the ability to work out compromises between conflicting applicants for the same lands. The thoroughness with which the special agents performed this service is reflected by the fact that few complaints have been received from applicants regarding the lands apportioned to them upon the basis of recommendations made by the special agents. The term leases issued as a result of these field examinations have produced, and will continue to produce, considerable revenue to the United States in the form of fees and rentals.

TYPES OF INVESTIGATIONS

A number of investigations have been made for the Division of Grazing relating to interference with the administration of the Taylor

Grazing Act. Attempts of individuals to control grazing through claims initiated under mining laws, and other efforts to appropriate the range without right, have been thwarted, and there are now pending a number of cases in which injunctions are being sought to prevent trespasses within grazing districts.

Numerous investigations were made concerning fraudulent schemes by groups of promoters whereby persons were induced to file applications for oil and gas prospecting permits. The perpetrators of the schemes, by means of fraudulent representations as to the possibilities of a high financial return, persuaded investors to pay disproportionate fees in return for mere acts of agency in filing the applications with the General Land Office. In many cases little or no effort was made looking toward the development of the land as required by the law and regulations, thus resulting in a complete loss to the applicants. Those reports showing violations of Federal statutes have been referred to the Department of Justice for appropriate action, while others involving violations of State laws have been submitted for prosecution in the State courts.

There were investigated a number of complaints regarding matters under the jurisdiction of the Department in connection with supervisory personnel of Civilian Conservation Corps camps. These complaints ranged from inefficiency and official misconduct to the misappropriation of Government property and funds.

The following criminal violations were investigated during the fiscal year ended June 30, 1939:

Impersonating a Government officer.....	1
Embezzlement	9
Forgery.....	1
Grazing trespass.....	5
Bribery	1
Fraud, sale of oil and homestead land.....	4
Fraudulent homestead entry.....	1
Conspiracy.....	1
Unlawful occupancy of Government lands.....	6
Submitting false claims against the United States.....	3
Depredation against Government property.....	1
Illegal trading with Indians.....	1
Coal trespass.....	1
Timber trespass.....	1

Seventeen persons were indicted during the year. Thirty-five defendants, most of whom were indicted prior to July 1, 1938, were convicted. Twenty-three criminal cases are pending action.

One assignment which required tireless effort was the task of making examinations and appraisals of approximately 660,000 acres of land in northern Arizona embraced in three exchange applications under the Navajo Boundary Extension Act. Physical inspection was made of the entire area.

As an illustration of the variety in the type and extent of the assignments which receive attention by the Division it is interesting to note that a recent case involved the examination of tracts of land which were so small that the special agent had to get off the land in order to look at it. One tract was 1 inch wide and 70 feet long; another $11\frac{1}{2}$ feet wide and $17\frac{1}{2}$ feet long; and another 5 feet wide and 8 feet long. These small tracts were formed between mining claims, and the examination of each required a separate trip of 20 miles on horseback. It was necessary that three days be spent on the case involving these three tracts, constituting a small fraction of an acre, whereas ordinarily a special agent can examine several hundred acres in one day.

LAND CASES INVESTIGATED

In cooperation with the Bureau of Reclamation a large number of examinations were made of lands within the Central Valley project, California, to clear the title relating to unpatented mining claims. Lands along the relocated right-of-way of the Southern Pacific Railroad Co., Shasta Reservoir, were examined, mineral appraisals made, and action taken to cancel invalid mining claims in conflict. In addition, examinations proceeded on both the Friant and Shasta Reservoir projects. A total of 1,450 cases involving mineral claims and mineral appraisals within these areas were disposed of during the year, and it is believed this work will result in saving the Government large sums of money that it might otherwise have been compelled to pay to persons whose claims were without foundation.

A similar assignment was the request of the War Department that examinations be made of all unpatented lands within the Muroc Bombing Reserve. This reserve embraces approximately 150,000 acres on the Mojave Desert in Kern and San Bernardino Counties, Calif. The area is used by the Army as a bombing range for its flying fortresses, as well as a machine gun practice range for its fighting and pursuit ships, and it is of vital importance that all questionable claims be eliminated so as to avoid subsequent damage suits. Over 1,300 reports were submitted during the year and it is estimated that the time of two men for the period of 1 year will be required to complete the assignment.

Timber trespass cases were received in approximately the same volume as during previous years. In addition to the correspondence necessarily carried on pertaining to this work, a large number of persons continue to call at the regional offices daily for the purpose of securing information concerning the laws governing the cutting of timber on public lands. The utmost cooperation is extended to these persons in providing them with the information which they seek. Close cooperation has been accorded the Oregon and California Re-

vested Lands Administration and the investigation of timber trespasses in the States of Oregon and California will be intensified during the present fiscal year.

Another of the more important investigations had to do with the validity of mining claims in the Lance Creek oil field, Wyoming. This investigation involved a determination as to whether all locators of these mining claims had made diligent efforts working toward a discovery of oil and gas prior to the passage of the Oil Lease Act of February 1920. The investigation was successfully completed, and it is probable that the Government will be able to recover the lands involved or collect substantial royalties.

An effort has been made to place the audits of the various Indian Office units on a more current basis. Many of these audits are highly involved and have necessitated detailed examination of the records and accounts of the various units. Sixty audits were made during the last fiscal year, and it is anticipated that each unit, of which there are more than 100, will be audited during the present fiscal year.

At the request of the Bureau of Mines a survey was made of the property, equipment, and records of the United States Helium Plant, Amarillo, Tex., for the purpose of determining the cost of producing salable helium. This investigation presented new and difficult problems because of the many factors entering into the cost determination of salable helium.

The more important investigations relating to the Puerto Rico Reconstruction Administration had to do with the construction of a cement plant and the organization of a corporation for the manufacture of butyl alcohol in Puerto Rico.

Investigations of mineral claims at the request of the United States Forest Service have resulted in court actions looking to the elimination of invalid claims within forest reserves.

During the fiscal year 1939 the Division of Investigations operated under an appropriation of \$440,000, which was expended as follows:

Salaries:	
Departmental.....	\$31, 498
Field.....	268, 211
Office supplies and equipment.....	9, 208
Travel expense and per diem.....	78, 000
Purchase, maintenance, and operation of automobiles.....	37, 200
Communication expenses.....	2, 100
Transportation of things.....	1, 000
Rent of office space.....	2, 700
Repairs to equipment.....	189
Stenographic services.....	28
Miscellaneous current expenses.....	1, 534
Unobligated surplus.....	8, 332
Total appropriation.....	440, 000

DIVISION OF GRAZING

R. H. Rutledge, *Director*

CONSERVATION activities of the Division of Grazing advanced upon a broad front during the fifth year of administration of Federal range grazing districts.

Whereas a large part of the work of the Division of Grazing since its establishment in 1934 was devoted to organization and laying the foundation upon which to build an administrative structure, the last year witnessed definite advancement of the whole conservation program. Studies to secure data as to periods of grazing use, movements of stock from range to range or to shipping points, and the qualifications of present and prospective users were continued as an important feature of the program.

Steady progress was made toward the issuance of term permits, an essential step in stabilization of the livestock industry.

Agreements and cooperative arrangements with State and Federal agencies continued as important features of the land-use and land-planning program. During the year the administration developed and made effective an intensive and detailed plan for more efficient management of the Federal lands under its jurisdiction.

Following field and Washington conferences a plan for the reorganization of the Division of Grazing was approved by the Secretary of the Interior on May 13. As approved this plan is built around a strong range-control and range-development structure with the essential business and related services needed for proper range administration.

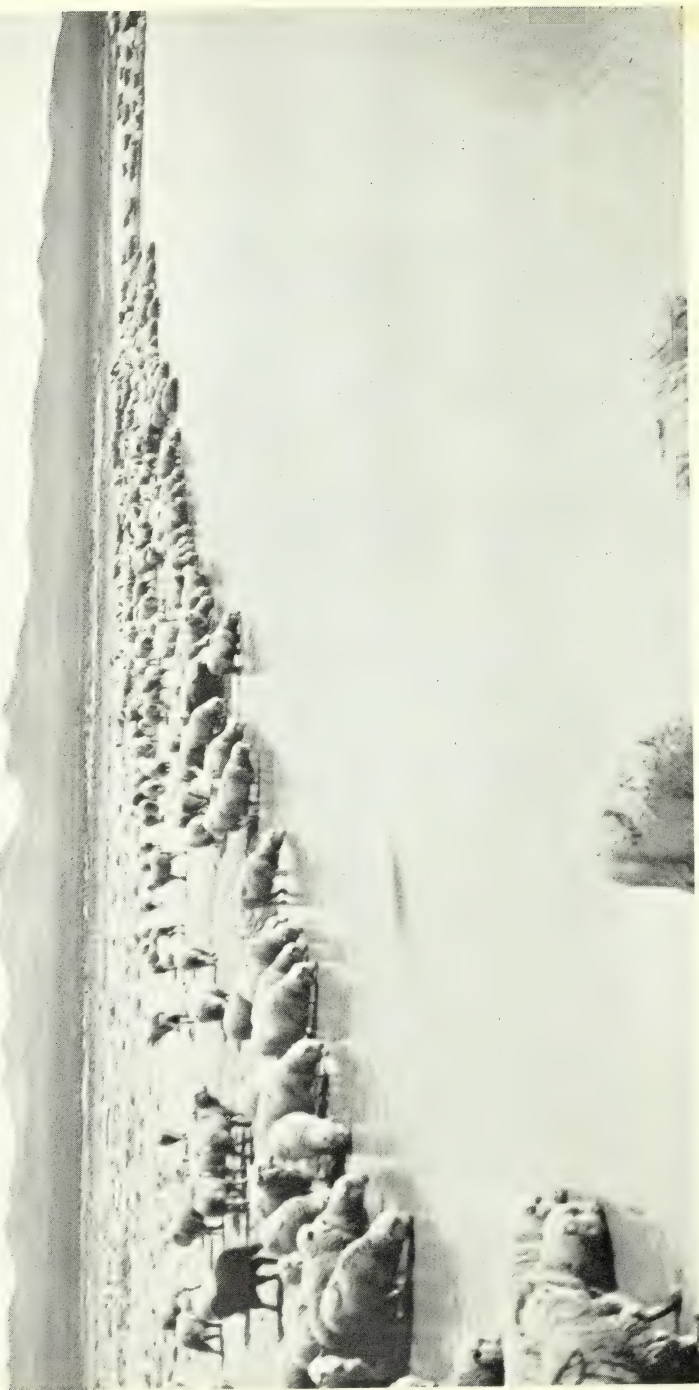
Radio facilities installed in five of the grazing regions were of exceptional value in facilitating contacts between C. C. C. camps and administrative headquarters. Much of the range territory is poorly serviced by roads and large areas are great distances from telephones. The recent drought period increased the range fire hazard and this modern means of communication was instrumental in marshalling and directing fire-fighting forces. The radio equipment proved to be both economical and effective and efforts are being made to extend such facilities to all regions of the Federal range territory.

ORGANIZATION

During the past 2 years the Division has been studying the application of its functions in order to determine the best type of organiza-



STORM ON THE RANGE IN NEW MEXICO.



SHEEP AT WATER PROVIDED ON A UTAH RANGE THROUGH THE CONSERVATION WORK OF THE DIVISION OF GRAZING.

tion to carry them out. These studies were crystallized during the fiscal year in a new organization set-up. This set-up divides the work into four principal branches—Operations, Range Management, Range Improvement and Maintenance, and Land Acquisition and Control—each headed by a Chief located in Washington.

The entire field administration is carried on through nine administrative regions, each region, in charge of a regional grazier, comprising a State unit with the exception that lands in Nevada and California have been grouped as one.

Protective measures to safeguard the ranges and watersheds from fires were carried out both through the efforts of the Division of Grazing and through agreements with State and other Federal agencies which provide for inter-agency use of facilities.

The administrative staff was increased by 42 members during the fiscal year, making a total of 167 Civil Service employees attached to the Division of Grazing on June 30, 1939. For the most part, the added personnel were employed in policing the grazing districts.

In addition to the regular staff there are 629 district advisors who are elected by popular vote within the district they represent and appointed to serve in a recommendatory capacity at the call of the regional grazier. The functions and duties of these district advisory boards as provided in the Federal Range Code are as follows:

District advisors may advise or make recommendations on the following matters:

1. The carrying capacity of the Federal range in the district.
2. Applications, under the Federal Range Code, for grazing licenses or permits, either regular, free-use, or nonuse, provided that no board shall make a recommendation on an application by any of its members. Such an application shall be acted on in the first instance by the regional grazier or district grazier.
3. Proper rules for fair range practice.
4. Allotments of range by classes of livestock or for community or individual use.
5. Seasonal use of the Federal range or any part thereof.
6. Applications for the construction or maintenance of improvements on the Federal range under section 4 of the act.
7. Any recommendations made by local associations of stockmen in the district.
8. Any other matters on which their opinion may be requested by the Secretary of the Interior.

Twenty-eight additional district advisors have been appointed to represent wildlife and recreational resources, under the provisions of Circular W-164 approved by the Secretary of the Interior on January 6. These district advisors were nominated by the respective State fish and game commissions or the corresponding State authority for the States in which the districts are situated.

STATUS OF GRAZING DISTRICTS

The 257,678,500-acre area embraced within the 50 grazing districts established includes 134,858,430 acres of public land subject to grazing

use and administration. This public-land area is interspersed with private and State lands all tied together in the general-use pattern. About 10,000,000 acres of this public-land area are included in prior withdrawals, such as stock driveways, power-site reserves, military reserves, naval oil-shale reserves, public-water reserves, and reclamation withdrawals, administered by the Division of Grazing under temporary agreement.

Grazing districts range in size from less than 250,000 acres to 10,000,000 acres. The average district has an area approximately that of Connecticut which has 3,064,800 acres.

ESTABLISHMENT OF GRAZING DISTRICTS, MODIFICATIONS AND ELIMINATIONS

On July 14, 1938, the Secretary approved an order establishing Arizona Grazing District No. 3, comprising a gross area of approximately 4,915,000 acres, of which approximately 3,946,767 acres are unappropriated and unreserved public land.

During the fiscal year the Secretary approved 18 modification orders prepared by the Division of Grazing, as follows:

	<i>Approximate gross area in acres</i>
7 orders eliminating areas containing only small scattered tracts of public land-----	1,360,900
2 orders transferring land between grazing districts-----	425,000
6 orders eliminating land in order that it might be included in national forests, monuments, or projects by other Departments--	559,000
3 orders including land within districts in response to petitions by local stockmen-----	470,000

LICENSES

In order to take care of the existing livestock industry pending the accumulation of sufficient data to warrant the issuance of term permits under section 3 of the act, the 1-year license system was continued during the year in all districts except Colorado No. 6. In that district, following the completion of the range survey, the temporary licenses were replaced by 10-year permits.

Grazing licenses and permits were issued to 19,342 stockmen owning 11,032,642 head of livestock in 50 grazing districts during the year. In addition, under the cooperative grazing association plan in Montana, 28 grazing associations operated approximately 240,000 livestock on lands of all ownerships. Forty-four licenses were issued for grazing a total of 4,345 livestock in Arizona grazing district No. 3, which was established at the beginning of the fiscal year.

Whereas the area of range placed under regulation increased 1.9 percent; the numbers of livestock allotted on the range increased 3.1 percent. Reducing the period of use on public land has allowed

many small operators to obtain range facilities and the increased numbers have placed no additional burden on the range due to the shorter grazing period.

FEDERAL RANGE CODE

Amendments to the Federal Range Code were approved on August 19 by the Acting Secretary of the Interior. These amendments, together with parts of the code approved on March 16 and June 22, 1938, were codified, and the codification was approved by Secretary Ickes on August 31, 1938.

This code contains the rules and regulations for administration of the range in accordance with prudent conservation principles. It outlines the procedure for adjudication of range privileges under section 3 of the act; limits the grazing use to the number of animals that can be safely carried without damage to the soil, water, and forage; sets up rules of the range as a guide to the protection and management of the resources; and outlines the processes by which the individual and the public may prosecute their respective interests in the use of the Federal range.

HEARINGS AND APPEALS

During the fiscal year 22,000 applications for grazing licenses were filed with the regional graziers. These applications were considered by the regional graziers, and action taken in accordance with the provisions of the Federal Range Code. That the action taken was satisfactory in the great majority of cases is indicated by the fact that appeals were filed in only 829 cases, which represent a very small percentage of the number of applications considered. Seven hundred and thirty-eight of these appeals have been settled and there were 91 appeals pending at the close of the fiscal year.

ENFORCEMENT

Administrative officers of the Division, assisted by range riders during concentrated seasonal livestock movements on the range, were successful in reducing the number of trespass cases during the year. Enforcement has been and is mainly a matter of education and understanding.

The accomplishments in this line are reflected in the fact that only five arrests for willful violation and 116 cases of minor infractions in which the violator had failed to comply with notices of trespass, have been reported. The five arrest cases have been brought to trial, the defendants fined, and the cases closed. In addition there were three civil cases, two of which were settled in favor of the Federal Government and the other case was dismissed.

The 116 cases of minor infraction were settled without legal procedure by amicable settlement wherein the infringement in each case was settled through voluntary offer of payment for damages to the United States in the total amount of \$4,654.06.

COOPERATION

Cooperative agreements with State and other Federal agencies that were arranged during 1938 were continued during 1939. Agreements concerning the loan of employees, fire fighting, range surveys, land use, experimental areas, drainage-basin areas, water-use activities, and joint management of lands on repurchased areas were entered into, renewed, amended, or extended to the extent of 34. At the end of the fiscal year, the total number of such agreements in effect was 47.

Accomplishments under the agreements have been very satisfactory and have aided materially in fulfilling the objectives of the act. The 47 agreements in effect are in many instances broad memoranda of understanding and have resulted in many local agreements being placed in execution between field representatives of the Division of Grazing and other agencies.

COOPERATIVE GRAZING ASSOCIATIONS

Cooperative agreements with State grazing associations and groups of stockmen, which were inaugurated in 1936, 1937, and 1938, continued during 1939, resulting in association agreements, including originals and amendments, amounting to 28 in number. During the fiscal year ending June 30, 1939, the number of these cooperative agreements with local associations of stockmen was increased by 6, and 14 agreements were amended. Activities of this nature were carried on under two main types of agreements with stockmen's associations. In Montana the method followed has been by the issuance of a grazing license to the association, while in Oregon the associations lease State and county lands and through agreement the Division of Grazing issues the licenses to the individuals involved. The effect is the same, however, in that the situation of interspersed land ownership, composed of State, Federal, county, tax-default, and privately owned lands is remedied to the end that a sane and proper use of all the land involved results.

Under both types of arrangements the carrying capacity of the range and the fees to be charged are fixed by the Secretary of the Interior in accordance with the Federal Range Code. The results of such cooperation in Montana led to the passage of the Grass Conservation Act in that State during the fiscal year. That act created the Montana Grass Conservation Commission, composed of five commissioners appointed by the Governor. This commission is made up

of four stockmen and one county commissioner, all of whom are officers in the State cooperative-grazing association. This new State law joins the forces of local and national conservation in dealing with one of Montana's greatest natural resources.

SOUTHERN PACIFIC LAND CO.

The cooperative agreement between the Division of Grazing and the Southern Pacific Land Co., which became effective January 1, 1937, expired December 31, 1938. It is being considered for renewal under slightly modified terms that are intended to extend further the benefits to be derived from systematic management of the public and private lands involved.

OTHER COOPERATIVE ACTIVITIES

Other cooperative activities conducted during the year included:

1. Predatory animal and rodent control work in cooperation with the Bureau of Biological Survey.
2. Insect control in cooperation with the Bureau of Entomology.
3. Joint range administration, study, and range improvement of repurchased areas within grazing districts in cooperation with the Soil Conservation Service.
4. Water spreading for natural revegetation in cooperation with the Soil Conservation Service.
5. Fire suppression and presuppression in cooperation with the Forest Service, Office of Indian Affairs, and State agencies.
6. Exchange of use and consolidation of ownership in cooperation with individuals and State land officials.
7. Maintenance of roads and truck trails in cooperation with counties.
8. Construction of range improvements in cooperation with State officials and local district advisory boards under provisions of section 10 of the act.

RANGE IMPROVEMENTS

The range improvement program became effectively coordinated in the regions through consolidation of the administrative and improvement units in the field. Plans effected under this consolidation took definite shape and resulted in economy and efficiency. Funds made available for range improvements under sections 10 and 11 of the Taylor Grazing Act were used primarily for the purchase of equipment and materials and in large part the labor was performed by the C. C. C. forces under supervision of the regional grazier.

CIVILIAN CONSERVATION CORPS

In cooperation with the Civilian Conservation Corps, the Division of Grazing enlarged its scope of activities in the accomplishment of construction and related projects for the improvement and development of natural resources in grazing districts. The Division's quota

of camps was increased from 45 to 90 during the fiscal year. This made possible a wide distribution of projects and enabled the Division to spread the improvement work over a larger area than heretofore covered. The distribution of the camps in the nine grazing regions was made primarily on the basis of public-domain acreage and the acute need for range rehabilitation. On that basis the present distribution is as follows:

	<i>Camps</i>		<i>Camps</i>
Region 2, Utah.....	15	Region 8, Colorado.....	8
Region 3, Nevada-California.....	19	Region 9, Arizona.....	5
Region 4, Oregon.....	9	Region 10, Wyoming.....	9
Region 5, Idaho.....	10		
Region 6, Montana.....	5	Total.....	90
Region 7, New Mexico.....	10		

Although many of the activities undertaken by the C. C. C. forces in the Division are of emergency nature, such as fighting fires, insects, and other destructive elements, the work in general is developed according to carefully prepared plans for a long-time range-improvement program. Major types of projects include water developments, fence construction, stock trails and corrals, rodent control, truck trails, bridges, terracing, check dams, posting of trails and boundaries, and related work of vital importance to the conservation and proper management of the range.

Water is the prime requisite of the public domain. Sections of the Federal range used partially or not at all in past years are being made available for grazing purposes largely through the development of an adequate and well-distributed stock-water supply. Dams have been built to impound the water from mountain streams and to preserve the early run-off, and check dams have been built in dry creeks for the purpose of arresting soil erosion and moderating run-off for impounding downstream. The development of springs where feasible has been accomplished, and, in many cases, wells have been drilled in an endeavor to provide reliable watering places on vast dry areas in order that the range may be more properly and seasonably serviced and thus afford a better distribution of use. In connection with this water development, storage facilities, such as troughs and tanks, have been constructed.

Closely allied with the water program is the work to open truck trails into the grazing regions and to build stock trails for the movement of animals from winter to summer range or to market. This trail construction opens up large areas of grazing lands formerly more or less inaccessible and not only furnishes much needed new pasture but also aids in the elimination of overgrazing in other areas. Holding corrals constructed along these trails allow stock to be held overnight on the way to market and are of great advantage to stockmen. A sufficient water supply is included in the construction

of each corral. Bridge and cattle guard construction are important parts of these trails and are of great assistance in expediting the movement of cattle and reducing losses of livestock.

An extensive rodent-control program has proved of great value in the conservation of soil and forage resources. More than 1,443,466 acres have been treated for the control of ground squirrels, gophers, prairie dogs, kangaroo rats, and jack rabbits. Eradication of poisonous weeds has proved very important in saving livestock, and 47,311 acres have been treated for infestations of poisonous larkspur, death camas, and other weeds which cause the death of hundreds of head of livestock.

The following table shows the accomplishments of the major work projects of the Division's Civilian Conservation Corps program for the fiscal year 1939:

Bridges-----	60
Fences-----miles-----	731.5
Reservoirs-----	54
Springs-----	90
Wells—fully equipped-----	35
Cattle guards-----	101
Corrals-----	34
Truck trails-----miles-----	1,285.8
Stock trails-----do-----	493.3
Check dams:	
Permanent-----	177
Temporary-----	711
Other flood-control structures-----	11
Acres treated for poisonous plant eradication-----	47,311
Acres treated for rodent eradication-----	1,443,466
Impounding and diversion dams-----	128
Fire suppression-----man-days-----	3,634
Other emergency work, such as flood control, snow removal, repair of damage by storms, search for lost persons, etc-----man-days-----	11,678

SAFETY AND EDUCATION

Responsibility for the safety program during the fiscal year 1939 was placed upon the regional graziers and the camp supervisory personnel, because of the shortage of personnel qualified for this special kind of work. Despite this fact, an extremely good record has been attained by the Division in both safety and education endeavors. The Division has consistently remained among the top three or four Government agencies in the matter of the least number of accidents. For the first 5 months of 1939 there were but 138 lost-time accidents. Considering that there were 1,096,590 man-days worked, the percent of accidents per 10,000 man-days was but 1.25.

The C. C. C. unit is vigilant and aggressive in its educational program in the various camps. The enrollees are given every oppor-

tunity to learn to operate the machinery used on the work projects, and, through the daily work in connection with classroom instruction, many skilled workers have been developed from completely untrained men. The effectiveness of the education and training on the job program of these C. C. C. camps may be judged from the fact that much of the difficult construction has been done under the supervision of foremen who were formerly enrollees.

In addition to this fact, a total of 63 enrollees were discharged during April, May, and June to accept outside employment. Twenty-nine enrollees received positions as a direct result of the training they had received in camp.

WILDLIFE

The appointment of wildlife representatives on the advisory boards has brought about a clearer understanding between the stockmen and the State and National wildlife agencies in the matter of use and preservation of the natural resources. The cooperative study of the wildlife situation resulted in the following steps in furtherance of the natural wildlife resources in the districts:

1. Vigorous enforcement of all game laws within the respective grazing districts.
2. A practical means for redistribution of big game in the so-called critical big-game areas to prevent starvation which is the natural result of excessive concentration.
3. Controlled hunting so that surplus wildlife may be removed systematically in such areas where the demand for forage exceeds the safe margin of supply.
4. Control of predatory animals.
5. The development and improvement of all necessary natural watering places to be used by domestic livestock and big-game animals jointly where practicable.
6. The fencing of selected water holes as an aid to the protection of upland game birds.
7. The piping of water from certain sources to a reasonable distance in order that game birds may have a suitable natural cover, amply protected, as nesting grounds.
8. Encouragement and protection of the propagation of migratory upland wild fowl.

Definite projects in selected localities for studying the needs and initiating remedies for balanced distribution and use of ranges by selected species of big game were outlined during the year.

The program for the transplanting of beaver that was initiated in Idaho in 1937 was enlarged in that State and initiated in two other States. This work is carried on through the cooperation of the Division of Grazing with the respective State game commissions, the Forest Service, and the Biological Survey. About 420 beaver were transplanted under this program in Idaho during the year. Under the plan, the beaver are taken from canals and ditches or from streams where their food supply has become diminished and transplanted to small streams on the public domain. In their new habitat, they per-

form valuable conservation work by checking stream run-off and at the same time building rapidly the State's beaver population.

The establishment in January 1939 of the Kofa and Cabeza Prieta Game Range in Arizona Grazing District No. 3 brought the total area of game ranges in grazing districts to about 5,000,000 acres.

Under the game-range plan the public lands are set aside for the joint use of wildlife and the grazing of domestic livestock with the primary right given to a specified number and species of wildlife.

LAND CLASSIFICATION

Rigid standards of classification in accordance with section 7 of the Taylor Grazing Act have been adopted and are being adhered to by the Division in its action on homestead applications in order to prevent the disposal of public lands which have no permanent value for farming purposes. Out of a total of 357 homestead applications for land in the Western States since the passage of the Taylor Grazing Act, only 19 have been found valuable chiefly for farming.

The Division also makes appropriate recommendations on applications for land within grazing districts under the exchange, sale, and lease provisions of the act.

The recommendations for designations of land applied for under the enlarged and stock-raising homestead acts and determination of the value of watering places for public purposes, together with the preparation of appropriate orders, are other functions of the Division.

At the beginning of the present fiscal year there were 697 cases pending under sections 7, 8, 14, and 15. During the year, 643 cases were received, making a total of 1,331 cases to be acted upon. Of this number 826 were disposed of by appropriate action, leaving 505 cases pending at the end of the fiscal year. Forty-two cases under the enlarged and stock-raising homestead acts were acted upon, and on June 30 there were 22 cases pending action by the Division; 160 acres were designated under the enlarged homestead act in one State, increasing the total acreage so designated to 268,471,905 acres; 2,748 acres of land were designated under the stock-raising homestead act in 8 States, increasing the outstanding area to 102,455,810 acres. During the fiscal year; 4,720 acres in 8 States were included in water reserves, and 2,430 acres in 9 States were excluded from such reserves, increasing the gross public water reserve area in 12 States to 513,673 acres.

RANGE SURVEYS

The main function of the range-surveys organization consists of the collection and recording of information that will enable administrative officers of the Division to bring about conservation and orderly use of the Federal range and stabilization of the livestock

industry. The activities included: (1) The gathering, analyzing, selection, and presentation of pertinent material already existing which concerns the public-range area to be studied; (2) securing historical data on past and present livestock use of the area; (3) determination of the extent, character, proper season of use, forage producing capacity, and suitable rate of stocking of the public range; (4) determination of the qualifications of livestock operators who use or desire to use the public range through the examination and rating of the base properties, both land and water, owned or controlled by those claiming dependence on the use of the public range; (5) furnishing such accumulated information to the administrative force as fast as it becomes available in order to form a factual basis for administrative action in the selection of those entitled to share in the use of the range; and (6) development of essential data and preparation of maps to be used in range-management plans and correlation of proper land-use principles involving all types of ownership.

At the end of the fiscal year, 3,257 of the 12,386 townships in grazing districts had been surveyed; status had been completed in 4,052 of the 13,349 master township plats involved; 162 of the 537 status maps had been prepared; 382 of the 537 base maps were drafted; and 10,248 of the 21,698 dependent properties had been appraised.

The objective to complete the survey of at least one district in each region during the year was realized in all regions except Utah, Nevada-California, Idaho, and Wyoming. In these regions the work is continuing with expectation of early completion.

The work of studying range plants progressed rapidly in the past year. Herbaria have now been developed in all regional offices. They average about 1,000 specimens each, with a fair representation of the important local grazing plants.

The cooperative range and ranch study, looking to the proper basis for determining Federal range adjudications and stable range and ranch use based on forage and economic factors in Nevada Grazing District No. 1, progressed very satisfactorily during the year. During this fiscal year, 6,388,590 acres of range in this district were surveyed.

Observations at the Squaw Butte Range Livestock Experiment Station in Oregon continued to emphasize the need for specific knowledge concerning optimum use of our desert and semidesert ranges. The methods used are simple and practical. A definite number of animals are kept on a definite pasture for a definite period and the before and after conditions of the forage are recorded. Results obtained are a guide to the proper stocking of similar areas. Some of the results already of recognized value are: (1) Conservation value and practicability of pasture rotation; (2) Improved grass cover by

systematic removal of sagebrush; (3) Value of properly distributed stock-water reservoirs; (4) Actual test data on maximum distance cattle should travel to water; and (5) Exclusion of the predator hazard. Livestock management is being studied in connection with the grazing research.

UTILIZATION RECORDS

During the past year, refinements and further development of a system of making utilization checks, have been made. A uniform method of describing the several classes of under, proper, and over use, and of recording and tabulating observations on utilization and records of actual use, was developed.

The method, which is called "primary forage plant method," is based on the plan of recording at the close of a grazing season specific information about each of the main forage plants, which carry the principal load of grazing use on a range area. Information concerning soil conditions, erosion, and other factors which influence the grazing use made, are considered and a conclusion reached which assigns the area under observation to one of nine described classes of degree of use. A sufficient number of such observations are made within each administrative unit to afford a picture of what is happening to the whole area under the existing conditions of use. Subsequent examinations, year after year, for comparative purposes in the same approximate locations, will give definite information as to the trend of range conditions. The locations at which the observations are taken are platted on a map to permit return for subsequent examinations and also to show diagrammatically the portions of the unit which are subjected to different degrees of grazing use. After the conclusions reached for the several observation locations within a unit have been summarized into a consolidated report for the unit, the findings are compared with data on the actual use made on that unit by livestock during the preceding grazing season. From these results, significant carrying capacity figures may be determined for the unit after several years' observations have been made.

The particular objectives of the method used are to start a definite record of range conditions in all grazing districts. This will provide specific information in the form of records used, uniform terms to describe the conditions observed, and give definite backing in record form for recommendations for range management.

RIO GRANDE BOARD

During the year the Division continued its activities in the joint study of the land-use problems of the Upper Rio Grande watershed. This study, sponsored by the Departments of Interior and Agricul-

ture, was initiated in 1937 by representatives of the Division of Grazing, General Land Office, and Office of Indian Affairs in the Department of Interior, and representatives of the Soil Conservation Service, Bureau of Agricultural Economics, and Forest Service in the Department of Agriculture. By agreement that year, the two Secretaries set up the Interdepartmental Rio Grande Committee to devise ways and means for improving the social and economic conditions of the native-rural population of the Upper Rio Grande Valley based on the possibility of reestablishing these people on the land which was their ancestral home.

The committee submitted a preliminary report in August 1937 outlining a plan for further study of the problem with the view of coordinating the procedure of the various Federal agencies for the restoration of the soil and water resources that play the dominant part in the support of the dependent population.

This resulted in the designation of the Interdepartmental Rio Grande Board composed of seven members—one each from the agencies mentioned and one from the Bureau of Reclamation.

During the fiscal year 1939 this board crystallized the former recommendation into a definite plan for shaping the land-use pattern into one that would give primary consideration in certain units of the area to fostering the benefit of the native rural population. About 200,000 of these people inhabit the area, usually the poorer areas, and derive their livelihood from four sources: (1) irrigated agricultural land, (2) livestock, (3) wage work, and (4) emergency relief, direct and through work projects.

With that in view the board solicited and obtained the cooperation of the State planning boards and other public and private interests to bring about needed adjustments in land use.

SUMMARY

The Division of Grazing operated on a regular appropriation of \$650,000 and collected \$833,385.27 from grazing fees.

High lights of activities and accomplishments in the various regions included the following:

UTAH REGION 2

The Utah region accommodates a larger number of livestock (2,600,000 head) and deals with more licensees (5,190) than any other Federal range State. Its 24,000,000 acres of public land are practically all included in the eight grazing districts established in 1935. The number of livestock licensed during the fiscal year 1939 represents a decrease of about 80,000 head during the four years of record.

Major Accomplishments

Subdivision of the 127 major range units into 361 smaller group and community range allotments.

Amicable settlement by adjustment in the field of most of the 45 appeals that were filed.

Collected delinquent grazing fees, which amount to approximately \$160,000 annually, to within 1 percent of the total assessed.

Closed 56 of the 74 trespass cases through approval of voluntary propositions of settlement.

Added five new C. C. C. camps.

Developed practical methods of reseeding depleted ranges.

Opened new territory to use and management by the construction of truck trails.

Cooperated with the State Fish and Game Department in obtaining an official estimate of big game animals grazing in the districts.

Adjusted livestock grazing in selected areas to improve range conditions for the conservation of wildlife. Established protective areas around certain springs and reservoirs to facilitate nesting for upland game birds.

Perfected the communication system between regional headquarters and C. C. C. camps by means of short-wave radio sets.

Cooperated with Federal and State agencies in the prevention and suppression of range fires.

Treated 200,000 acres of Federal range infested with rodents, using 17,000 pounds of bait.

Cleared 494 miles of snow-bound trails to enable stockmen to reach stranded stock with feed.

Completed field examination of 365 dependent properties, involving 730,453 acres of land, and conducted range surveys covering 848,619 acres of Federal range.

NEVADA-CALIFORNIA REGION 3

The Nevada-California region embraces seven grazing districts with a total area of 37,679,221 acres of public land. During the year 2,479 licenses were issued to graze 386,785 cattle, 18,258 horses, 1,494,710 sheep, and 2,437 goats.

Major Accomplishments

Installed district offices in six grazing districts, resulting in a more efficient patrol and administration of the resources.

Expanded the grazing control program by the addition of 450,000 acres to Nevada Grazing District No. 4.

Completed range surveys on 6,388,590 acres of land. Completed landownership checks on 2,060 townships.

Conducted a reconnaissance study of the Meadow Valley Wash for inaugurating erosion control activities and installed control structures in the main tributaries of that drainage.

Added 10 C. C. C. camps, bringing the total operating in the region to 19 camps.

Eradicated poisonous weeds on 13,191 acres and Mormon crickets and grasshoppers on 16,186 acres.

Completed a preliminary count of wildlife inhabiting the grazing districts, finding the principal species to include 25,500 deer, 11,000 antelope, and 400 bighorn mountain sheep.

OREGON REGION 4

The 21,000,000-acre area of Oregon's seven grazing districts includes 11,298,981 acres of Federal range. During the year, the Federal and non-Federal lands in the districts were welded further into a closely knit land-use pattern through cooperation with the owners and operators of the private, State, and county lands involved.

Major Accomplishments

Improved communication between the C. C. C. camps and headquarters by the installation of radio sets.

Completed range surveys in Oregon Grazing Districts Nos. 1 and 7 and prepared these districts for term permits.

Inaugurated a program for transplanting beaver to small streams in the grazing districts.

Eradicated Mormon crickets from the most critical sections of an 800,000-acre cricket-infested area.

Participated in suppression and presuppression of range fires, involving large areas of Federal range.

Conducted intensive erosion-control work in a 30,000-acre area.

Developed cover-protective areas around springs suitable for the protection of game birds.

Eliminated about 1,000 unclaimed wild horses from the Federal range in southeastern Oregon.

Installed four new C. C. C. camps during the year.

Completed the checking of land status records for the region, involving 1,026 townships, and surveyed 552,960 acres of Federal range.

IDAHO REGION 5

The four grazing districts in Idaho blanket the southern part of the State on either side of Snake River, embracing a gross area of approximately 22,000,000 acres, of which 11,644,745 acres are Fed-

eral range. Idaho ranks second among the regions in the number of licensees. During the year 4,000 licenses were issued to graze 1,952,222 head of stock. Seventy percent of the sheep and 35 percent of the range cattle and horses owned in Idaho use Federal range during some part of the year.

Major Accomplishments

Conducted a wildlife reconnaissance survey showing the following game animals and birds in the districts: 15,875 sage hens, 8,152 grouse, 10,940 deer, 855 elk, 775 mountain sheep, 725 mountain goats, and 6,956 antelope.

Posted fire-prevention signs and prepared fire-plan maps for the entire region.

Added eight new C. C. C. camps during the year.

Engaged in fire presuppression and suppression work on 39,150 acres of Federal range, constructing 200 miles of fire guards and fire breaks.

Transplanted 129 beaver to small streams of the Federal range.

Treated 241,775 acres for rodent control, 138,000 acres for the eradication of jack rabbits, and 6,700 acres for insect control.

Rid the range of 497 predatory animals.

Laid out and posted 128 miles of stock driveway.

MONTANA REGION 6

Five C. C. C. camps were installed in Montana grazing districts during the year. Montana ranges recovered substantially from the severe drought of 1933 to 1936. Intensive studies were made to determine the injurious effects of the drought on important forage species. The field work involving the gathering of all essential data for term permits was completed in Montana Grazing District No. 4.

NEW MEXICO REGION 7

Three new district offices were set up at Deming, Alamogordo, and Roswell, respectively. Seasonal and related conditions that influence the stock business caused a reduction of range use in the region from 858,024 head of livestock on April 30 to 777,125 head on June 30.

Preliminary range surveys were made on 5,552,640 acres during the year. Utilization studies were made and detailed information was assembled for New Mexico Grazing District No. 5, placing this district in readiness for transition from temporary licenses to term permits.

The 80-mile Magdalena stock driveway, accommodating 25,000 cattle and 50,000 sheep annually, was fenced during the year. Due

to control afforded by this fenced driveway, forage within the driveway showed a marked improvement over that on adjoining ranges. Two hundred sixty-six miles of miscellaneous stock-driveway boundary were fenced and 35 miles of stock trails constructed.

Approximately 439,761 acres of land were treated for extermination of rodents. The eradication of poisonous weeds was undertaken on 4,093 acres.

Thirty-one reservoirs were constructed, having a total capacity of 17,464 acre-feet, directly benefiting approximately 75,000 acres of Federal range. Small erosion-control projects included the construction of 585 check dams.

COLORADO REGION 8

Colorado Grazing District No. 6 was placed on a term-permit basis during the year upon the completion of the range survey in August 1938. Sixteen townships (368,640 acres) were surveyed during the year.

An agreement was reached during the year with the Colorado Fish and Game Commission whereby 240 acres of Federal range were set aside as a game-bird refuge.

Three new C. C. C. camps were installed in the region during the year.

A deer and beaver census was conducted in Grazing District No. 1. A comprehensive wildlife-cooperative program was inaugurated, looking to harmonious resource management in the interest of both livestock and wildlife.

Principal accomplishments in the range improvement program included the construction of 15 bridges, 13 diversion dams, 2,651 rods of fence, 1,450 feet of open ditches, 81 miles of truck trails, 74 miles of stock driveway. Also, 4,709 acres were treated for the eradication of poisonous weeds and 256,870 acres were treated for rodent extermination.

ARIZONA REGION 9

An additional 3,946,767 acres of public land were brought under the program in Arizona during the year by the establishment of Arizona Grazing District No. 3 on July 14, 1938. The gross area of Arizona's grazing districts is 15,179,000 acres of which 9,375,110 acres are public land. Licenses for grazing domestic livestock in this new district were first issued on January 1, 1939. On January 25, 1939, the Kofa and Cabeza Prieta Game Range in Arizona Grazing District No. 3 was established.

A forward step in the program was the subdivision of the Arizona strip (Arizona Grazing District No. 1) into individual and group allotments.

Federal range aggregating 921,600 acres was surveyed for carrying capacity during the year, and 64 individual ranches were examined for rating grazing privileges on the public lands.

Eighteen base maps were compiled, covering a territory of 20,736 square miles, and land status records were completed on 161 townships.

Five hundred ninety-one licenses were issued to graze 54,759 cattle, 2,259 horses, 119,107 sheep, and 32,382 goats.

WYOMING REGION 10

Wyoming's five grazing districts cover a gross area of 21,735,700 acres, of which 12,996,801 acres are public land. Licenses were issued to 1,478 applicants to graze 152,728 cattle, 14,104 horses, 1,444,840 sheep, and 254 goats. This represents an increase of 38,716 livestock and 22 licensees over the previous year. The number of sheep was increased by 48,807 head, and the number of other livestock was decreased by 10,091 head. The total range use was actually reduced due to the shorter time the animals were allowed to graze the public land.

Six new C. C. C. camps were established during the year.

DIVISION OF TERRITORIES AND ISLAND POSSESSIONS

Ernest Gruening, *Director*

THE Division of Territories and Island Possessions has continued its rapid expansion of duties and responsibilities during the fiscal year 1939. Under the President's Reorganization Plan No. 2, which became effective July 1, 1939, the personnel was more than doubled by the transfer of the Bureau of Insular Affairs from the War Department to the Division, thus bringing within its jurisdiction the Federal affairs pertaining to the Philippine Islands. Although the actual transfer did not become effective until the beginning of the fiscal year 1940, considerable preliminary planning was necessary during the two months which elapsed between the date of the issuance of the reorganization plan and the date of the actual transfer.

Early in February 1939 interest was aroused in various Government Departments in favor of an expedition to the Antarctic regions for the purpose of establishing sovereignty in the name of the United States to those areas which had been explored previously and claimed as a result of the Ellsworth and Byrd expeditions. The sum of \$10,000 was appropriated in the Second Deficiency Appropriation Act, Fiscal Year 1939, approved May 2, 1939, for initial expenses of this undertaking. Later in the Urgent Deficiency Appropriation Act of 1939, the additional sum of \$340,000 was appropriated for the purpose of outfitting and equipping the expedition. Although the proposed expedition was later designated as the United States Antarctic Service, whose policies were to be determined by a Board consisting of the Director of the Division of Territories, representatives of the Navy Department, United States Coast Guard, and the Department of State, with Rear Admiral Richard E. Byrd, United States Navy, being designated as the commanding officer of the expedition, the responsibility for its organization devolved largely upon the Division of Territories of the Department of the Interior.

In September 1938 the stock of the Alaska Rural Rehabilitation Corporation, which at that time was held in pledge by the Honorable Harry L. Hopkins, then Administrator of the Works Progress Administration, was transferred to the Secretary of the Interior, and the Federal supervision of the Matanuska Colony program was assigned



THE WORK OF THE DIVISION OF TERRITORIES AND ISLAND POSSESSIONS
REACHES FROM ALASKA TO THE TROPICS.

*Upper: Field of cabbage on one of the farms of the Matanuska Colony, Alaska.
Lower: Part of the harbor at St. Thomas, tourist center in the Virgin Islands.*

to the Division of Territories and Island Possessions. There are at the present time approximately 142 families in the Colony who appear to be satisfied with their present status and it is believed most of them will continue to reside in the Colony.

During the year the Division continued its administrative functions of coordinating and supervising the activities under its jurisdiction, which includes the governments of Alaska, Hawaii, Puerto Rico, and the Virgin Islands; also the Alaska Railroad, Alaska Road Commission, Alaska insane patients, the Consolidated Purchasing and Shipping Unit at Seattle, the economic and social program of the Virgin Islands Company and the colonization projects on Jarvis, Baker, Howland, Canton, and Enderbury Islands in the Pacific Ocean.

On April 13, 1939, a contract was entered into between the Department of the Interior and the Pan American Airways, Inc., whereby certain areas on Canton Island were leased by the Federal Government to Pan American Airways for use as an intermediate station in connection with its commercial trans-Pacific transport service between California and New Zealand. This contractual arrangement was ratified by Great Britain, which country also claims sovereignty and reserves certain rights and privileges to use the Pan American facilities for a period of 50 years.

THE TERRITORY OF ALASKA

The Division took an active part in the affairs of the Territory of Alaska during the fiscal year 1939 in presenting the budget requirements of the Office of the Governor of Alaska, the Alaska Railroad, the Alaska Road Commission, and for the care of the legally adjudged insane of Alaska as well as in supervising the activities of the Seattle Consolidated Purchasing and Shipping Office and the affairs of the Matanuska Colony. The Division also cooperated with the several branches of the Interior Department, of other Departments and agencies of the Government having activities in Alaska in determining matters of policy and beneficial legislation affecting the Territory.

Important legislation passed during the Seventy-sixth Congress pertaining to Alaska included an act granting authority to the Postmaster General to contract for steamers and other power-boat service from Seward to the Bristol Bay area in order to secure a safe and sea-worthy vessel of sufficient size to provide adequate space for mail, passengers and freight; a House resolution authorizing an investigation of the fisheries of Alaska; substantial steps in the program for the defense of Alaska including authorization and appropriation for construction of naval and other air bases; as well as an appropriation

to provide for the purchase of reindeer for the purpose of establishing a more complete and self-sustaining economy for the natives of the Territory.

During the fiscal year 1939, the Alaska Railroad operated continuous transportation service between Seward and Fairbanks, a distance of 407.3 miles, and on branch lines totaling 30.5 miles into the Matanuska and Nenana coal fields. The passenger train schedule in effect during the summer of 1938 provided for three round-trips each week between Seward and Fairbanks, while the supplementary service out of Seward to Anchorage and Palmer, and out of Fairbanks to Nenana and Mt. McKinley National Park was operated in conjunction with the arrival of passenger steamers at Seward and of Yukon River steamers at Nenana. A reduction in passenger train service was made on September 9 to one round-trip weekly, the schedule continuing throughout the winter until June 28, 1939, at which time the summer schedule was again adopted. Extra passenger trains were operated in addition to the scheduled service when required to furnish special transportation, or to furnish connections with steamers arriving at Seward from Seattle. Mixed train service between the Anchorage and Matanuska branch line points was operated variously, depending upon the coal to be moved. Freight train service between Seward and Fairbanks varied from weekly to semi-weekly depending upon steamer schedules at Seward, and the volume of traffic. Extra freight trains also were operated when required. River service on the Tanana and Yukon rivers was carried on from the middle of May to the first of October. A regular trip by river steamer was made every two weeks between Nenana and Marshall.

Although the railroad was operated at a deficit of \$19,830.85 for the fiscal year 1939, the financial results as a whole were considered encouraging. The revenues of the railroad, both for freight and passenger service, showed a considerable increase over the revenue for 1938. The deficit was caused by an increase in the cost of operation due to wage increases, and the extension of leave privileges to practically all employees of the Alaska Railroad.

Rail-line passengers numbered 27,436 with revenues of \$259,452.20. Rail-line freight amounted to 157,904 tons, of which 104,066 tons consisted of coal. Operating revenue amounted to \$2,353,927.49 and operating expenses were \$2,371,490.42.

During the summer of 1938 the sum of \$168,400 was provided by the Works Progress Administration for employment of relief labor in ballasting and surfacing the track and replacing deteriorated ties. This amount was fully expended for that purpose during the 1938 season. A subsequent allotment of \$71,000 was made available in the spring of 1939, which provided employment for approximately 350 men from the fifteenth of May to the thirtieth of June.

On October 23, 1938, a fire originating in an outfit car destroyed a warehouse at Anchorage with the railroad stock of materials, supplies, equipment, and commissary; also a recently completed cold storage plant and its contents. A deficiency appropriation in the amount of \$200,000 was obtained, which included \$45,000 for the construction of a new warehouse, the balance to be used for the replacement of destroyed supplies and equipment.

A new hotel constructed with Public Works funds at the entrance to Mount McKinley National Park was placed in operation June 1, 1939, and will continue in use during each tourist season. The hotel will provide accommodations for tourists traveling on the Alaska Railroad who may desire to stop over to visit Mount McKinley National Park.

The Alaska Road Commission is charged with the construction and maintenance of roads, bridges, and trails in Alaska outside National Forests. The construction and maintenance of air fields, telephone lines, and shelter cabins are also undertaken for the Territory.

Funds are made available by Congressional appropriation from the Alaska fund, and from contributions by the Territory and others. A total expenditure from all sources by the Commission during the year was \$828,598.

The road system in Alaska maintained by the Road Commission consists of approximately 2,100 miles of roads and tram roads; 1,500 miles of sled roads and 7,000 miles of trail. The only funds available for construction work during the year were contributed by the Territory, municipalities, and other sources.

The legally adjudged insane of Alaska are cared for under contract negotiated by the Secretary of the Interior with the Sanitarium Co. of Portland, Oreg., which has provided care and treatment for the insane patients from Alaska since 1904. The operations of this institution are under the immediate supervision of a psychiatric supervisor employed by the Department. The present contract became effective January 15, 1938, for a period of five years at the rate of \$648 per patient, per annum. At the beginning of the fiscal year 312 patients were receiving treatment. During the year 56 patients were admitted, while those deceased, discharged, or transferred numbered 63, leaving 305 persons in the institution on June 30, 1939.

THE VIRGIN ISLANDS

Developments during the past fiscal year have sharply revealed the fundamental differences in the basic economy of the two municipalities of the Virgin Islands.

The sugar business, the basic industry of the island of St. Croix, suffered another severe set-back caused by a drought in 1939 fol-

lowing the drought of the previous year, which has again gravely affected agricultural activities. Both the sugar and cattle businesses have suffered heavy losses which have been reflected in the fiscal affairs of the municipality.

St. Thomas, on the other hand, continued to show improvement due to substantial increases in the shipping business and in the tourist trade. Eight hundred and fifty ships with a total tonnage of 3,682,121 called at this port during 1939 as compared with 814 ships with a total tonnage of 3,239,975 in 1938. The transshipment of bauxite has continued, bringing 33 ships to the port for discharging and loading. Twenty-four cruise ships with 11,715 passengers called at St. Thomas as compared with 6,487 passengers from 13 ships in 1938. Ninety-five war vessels called at the port. Most of these were vessels of the United States Navy which conducted extensive maneuvers in the Caribbean area during the winter.

To improve the economic situation an effort was made to secure relief from discrimination against the Virgin Islands' sugar industry. A bill was introduced in Congress to authorize the return to the Virgin Islands Treasury of Internal Revenue taxes on articles imported from the islands into the United States; the repeal of the export tax of \$6 per ton on sugar raised in St. Croix, and the granting of benefit payments to growers of sugar in the Virgin Islands. The urgency of the matter caused each of the municipalities to send official delegations to Washington who, together with the Governor and officials of the Department of the Interior, presented the Virgin Islands' case before a subcommittee of the Ways and Means Committee of the Congress. In spite of the fact that sugar grown in the Virgin Islands is the only sugar grown under the American flag which is subject to these handicaps, the bill failed to pass. If the bill had been in force in 1939, 338 small farmers who received an average of \$24.947 per acre this year, a yield below the cost of production, would have received \$36.547 per acre. On an average holding of 7 acres, this would have meant a gross income to them of \$269.82, as against \$174.82 actually received.

To safeguard the only available market (Puerto Rico) for Virgin Island cattle, a tick-eradication program was inaugurated under local laws closely modeled after Puerto Rican law. Restrictions imposed on the shipment of cattle and the severe drought, which has caused great loss of animals, have combined to endanger this industry, which is of second importance in each island.

Additional work-relief allocations were made, permitting the continuation of a road-improvement program which has made substantial progress. Steady progress has also been made in improving the sanitary facilities of the three towns in the Islands. A mattress-

making project in St. Thomas and sewing projects in both municipalities furnished employment to a considerable number of women, most of whom are heads of families. The success of the nursery-school program encourages its expansion in the new fiscal year.

The Farm Security Administration has established a field office in the Virgin Islands, through which loans to small farmers are being advanced. It is proposed to have this agency take over the administration of the various homestead projects in the islands.

Approximately 750 persons in St. Thomas are engaged in the production of goods for sale through the Virgin Islands Cooperatives. Sales of the three units—Handicraft Cooperatives, the Cabinet Makers Cooperatives, and the Farmers Cooperatives totaled \$60,752.31 during the fiscal year.

The Legislative Assembly for the Virgin Islands enacted a uniform Electoral Law for the Islands, and a law to standardize leave of absence for Government employees.

The revenues of the municipality of St. Thomas and St. John again showed substantial increase over the previous year, while those of the municipality of St. Croix showed a very considerable decline. This decline was due in part to the decrease in revenue from the sugar business resulting from drought and also because the factories withheld shipments of the 1939 harvest in the hope that Congress would repeal the export tax on sugar.

THE VIRGIN ISLANDS CO.

The Virgin Islands Co. by a special ordinance enacted by the Colonial Council for the Municipality of St. Thomas and St. John was chartered as a Government-controlled corporation on April 16, 1934, to aid in the economic rehabilitation of the Island of St. Croix.

That the activities of the corporation cover a wide variety of endeavors is evidenced by the following: It grows and buys sugarcane for the manufacture of raw sugar and sells this sugar to United States refineries; it manufactures and sells light and heavy "Government House Rum" for sale in the United States, Hawaii, Alaska, and the Virgin Islands; it manufactures and sells a special distillate to the Angostura-Wuppermann Corporation in St. Thomas for the making of bitters; it has a poultry farm and sells chickens and eggs in St. Croix and St. Thomas; it crushes rock and sells this to the Government for the construction of St. Croix roads; it rents tractors, farm equipment, land, trucks, and other equipment to the people of St. Croix; it sells cane seed; it does general repair work at its machine shops; and it sells cattle and milk. It sells alcohol to the Government hospitals. It does business with the Federal homesteaders and the Federal Homestead Authority. It rents equipment

to the La Grange Sugar Factory, sells cane to and buys molasses from this company as occasions arise.

Raw sugar represents about 60 percent of St. Croix's exports and the sugar quota for the island established by the Sugar Act of 1937 amounts to only thirteen ten-thousandths of the United States consumption. Rum makes up about 35 percent of the island's exports, and this same rum is estimated to be less than 4 percent of the United States consumption. In other words, raw sugar and rum together represent close to 100 percent of the exports from St. Croix, and these same articles are almost unnoticed in the United States consumption.

The raw-sugar business is the only business to which people can look for employment, and the internal revenue on rum is the only income the municipal government (St. Croix and St. Thomas and St. John) might secure to balance its budget without continually and annually appealing to Congress for deficit appropriations as is the present practice.

The Virgin Islands Co. has in 4 years made the following important contributions to St. Croix economic rehabilitation:

1. Employed directly 1,000 persons, which is 20 percent of the island's laborers. This indirectly has given employment to about 15 percent more of the island's laborers.

2. Has improved the laborers' pay, housing, sanitation, provision gardens, and community centers.

3. Reestablished the bankrupt properties and put them to economic use to create commerce in sugar and rum and pay about \$35,000 per year in taxes to the local government.

4. Furnished a steady market for 700 small growers and Federal Homesteaders with mill capacity to take care of more than four times as much cane as they can grow.

5. Reestablished a rum business which pays \$136,000 per year in internal-revenue taxes.

6. Rents modern tractors and farm equipment and sells the best varieties of cane seed to the small grower.

7. Brought new manufacturing business to St. Thomas (Sarthé-St. Croix Co. and Angostura Wuppermann Corporation) by contract.

Although the figures for the fiscal year 1939 are not yet available, the progress of the Virgin Islands Co. in reestablishing a sugar- and sugarcane-products industry is indicated by the following analysis of sales:

Gross Sales and Miscellaneous Income for Year Ended June 30

	1935	1936	1937	1938
Raw sugar.....			\$101,820.16	\$195,335.60
Government House Rum.....	\$954.81	\$8,609.50	92,984.71	106,851.13
Special distillate.....			1,532.58	11,435.74
Tomatoes.....	170.79	2,624.12	4,979.65	
Other income.....	1,797.60	42,386.15	20,372.30	31,375.70
Total.....	2,923.20	53,619.77	221,689.40	344,468.17

The Island of St. Croix is the largest of the Virgin Islands group and its 15,000 inhabitants depend almost entirely upon the cultivation of sugarcane and the processing of raw sugar and rum for a livelihood. The cotton business was wiped out by the pink bollworm. Ventures in tomatoes, citrus fruits, sisal, tobacco, cocoa, coffee, and onions proved to be without economic success and were discontinued. However, the cattle business and the rum industry have survived and seemingly have permanent places in the economic structure. The 939 growers of sugarcane come under the restrictive provisions of the Sugar Act of 1937 which subject their sugar to the quota and processing taxes, but Congress did not extend the benefit-payment provisions of the Act as an offset. Unlike growers in Hawaii, Florida, Puerto Rico, Louisiana, and the other sugar areas, the St. Croix grower is the only one under the American flag so discriminated against. In addition, he pays an export tax of \$6 per ton on all the raw sugar shipped to the United States and is the only American citizen required to pay a tax on goods for interstate commerce as the wage and hours legislation which was extended to the Virgin Islands defines these sugar shipments.

It is essential that remedial legislation be enacted by the Congress to (1) make it possible for the grower of sugarcane to earn a living by his own labor and gradually replace the hundreds who are now on the relief rolls, (2) make available to the treasury of the Virgin Islands the revenues from the Internal revenue taxes collected on articles of Virgin Islands manufacture so the island legislators for the Municipality of St. Croix and the Municipality of St. Thomas and St. John can, from the growth and products of their own communities, derive revenue for the costs of their schools, hospitals, institutions, sanitation and police, as other island possessions have been authorized to do, and at the same time end the unworkable system of municipal deficit appropriations which have been made annually by the Congress ever since the United States Government acquired the Virgin Islands in 1917.

PUERTO RICO

The finances of the Insular Government made a very satisfactory showing. Total revenues available during the year aggregated \$58,203,348.39, while the expenditures amounted to \$44,496,702.25, leaving a cash balance of \$13,706,646.14 on June 30, 1939. Imports were valued at \$82,724,182, of which \$75,684,719 worth came from the continental United States. Exports were valued at \$86,263,926, of which \$84,560,006 worth were shipped to the continental United States.

The total receipts for the various municipal governments during the year were \$11,594,155.10 and disbursements aggregated \$12,068,-

733.67. The cash balance on June 30, 1939, was \$3,825,656.38, as compared with \$4,300,234.95 on July 1, 1938.

The Puerto Rico Lottery, established in 1934, made available during the fiscal year \$475,270.99 to the Insular Government for the eradication of tuberculosis, and a similar amount to municipalities of the second and third class to be used exclusively in the service of health and public charity.

The number of visitors to Puerto Rico during the year, including Navy personnel, was 47,529. The total revenue derived during the year from the tourist business, including expenditures of approximately \$400,000 by Navy personnel, is estimated at more than \$1,100,000.

The potentialities of developing, in connection with the University of Puerto Rico, an inter-American university as a center for the exchange of American and Latin culture, had gratifying recognition in the visit to Puerto Rico this year of a Commission of noted educators, selected by the President to make a thorough study of the problem. The report of the Commission was favorable and outlined a tentative plan for procedure, which included the proposal for establishment of six graduate and research units.

The strategic importance of Puerto Rico for the defense of the Panama Canal, the South Atlantic, and Gulf States, and the trade routes of the Caribbean, has been recognized by the National Government. The Island recently was made a separate military department, the establishment of naval and military air bases and a submarine base has been authorized, and the number of troops is to be increased substantially. In this defense program, the people of Puerto Rico are cooperating loyally. Isla Grande, in San Juan Harbor, the estimated value of which is \$10,000,000, has been ceded to the Federal Government for use as a naval air base. The dredging of San Juan Harbor has been virtually completed, at considerable expense to the Insular Government, and will provide a safe and convenient anchorage for heavy war craft. A large graving dock of the most modern type, which will be at the disposition of the Navy as well as of commercial vessels, also is under construction at San Juan.

Puerto Rican troops served with distinction in the World War. Many individuals were overseas with A. E. F. organizations, and two regiments from the island garrisoned the Panama Canal Zone throughout the period of hostilities. There are now many more applicants for enlistment in the Sixty-fifth Infantry and the Puerto Rican National Guard than there are vacancies. An increase in the authorized strength of the guard and the formation of aviation and coast defense units will be welcomed by the Puerto Rican people.

Benefits of sections 5 and 6 of the Social Security Act were extended to Puerto Rico by act approved August 10, 1939.



TRAINING FOR ALL IN PUERTO RICO.

Upper: Smiling pupils leaving Eleanor Roosevelt School, built by the Puerto Rico Reconstruction Administration.

Lower: The whole family practices new farming methods under PRRA Conservation program.

PUERTO RICO RECONSTRUCTION ADMINISTRATION

Miles H. Fairbanks, *Assistant Administrator*

IN 1935 the Puerto Rico Reconstruction Administration, made a part of the United States Government's vast relief program by President Roosevelt, was established to help the Puerto Rican help himself, to aid in the restoration of general employment, and to improve the standard of living for Puerto Rico's 2,000,000 American citizens.

The P. R. R. A. operates under the jurisdiction of the Department of the Interior with Secretary Ickes as Administrator. P. R. R. A. funds are derived from appropriations under the Emergency Relief Act. During the fiscal year just closed the P. R. R. A. obligated a total of \$12,938,150.36. This was divided as follows: For the purposes of rural rehabilitation, \$4,368,117.83; engineering \$3,950,966.86; loans and assistance to farmers and cooperatives \$1,919,179.57; rural electrification \$1,051,662.85; forestation \$333,763.83; social and medical service \$284,801.86; food commodity distribution \$179,931.82; housing management \$99,733.46; administration \$657,760.99, and miscellaneous \$92,231.29. This left an unencumbered balance of \$1,737,849 on June 30, 1939.

The work which has been done during the past four years by the P. R. R. A. cannot be referred to strictly as emergency relief. Because of the permanency of its work, future generations will benefit extensively from reconstruction accomplished by the P. R. R. A.

The reason for this is that behind the works of the P. R. R. A. stands the conclusion that the primary need for Puerto Ricans is not a direct dole-like service from the Federal Government, but a carefully developed economy, upon which in years to come the people can erect a stable trade and draw therefrom a measure of self-sufficiency.

The P. R. R. A. program has gone further than this. It has attempted to bring into the lives of Puerto Ricans who need it at least a minimum of medical aid and social service, and the beginnings of cultural development.

COORDINATED ACTIVITY

It has been fundamental with the present administration of the P. R. R. A. that it cooperate wherever possible with other Federal and Insular agencies in the solution of Puerto Rico's problems. There

has been direct cooperation in the Island's forestry program involving the United States Forestry Service, Insular Forestry Service, and P. R. R. A. Forestry Division; the P. R. R. A.'s rural electrification program has been for the express purpose of aiding the Insular Government in developing the Island's natural resources; the United States Department of Agriculture's Bureau of Animal Husbandry and the Insular Government have cooperated in the P. R. R. A.'s cattle-tick-eradication program; schools built by the P. R. R. A. have been designed and located in accordance with the program of the Insular Department of Education; roads, waterworks, public buildings, and other works have been projected only after deliberation with insular and municipal officials.

A series of conferences called by the Assistant Administrator of the P. R. R. A. in August 1938, and attended by representatives of various Federal and Insular Government agencies, resulted in effective measures.

As a result of these conferences, the Program of Coordinated Activity in connection with agricultural development was drafted and approved October 26. Those attending the conferences were the Insular Commissioner of Agriculture and Commerce, Director of the Insular Agricultural Extension Service, Director of the Insular Agricultural Experiment Station, Dean of the College of Agriculture and Mechanic Arts, Vocational Director of the Insular Department of Education, Director of the Puerto Rico Tobacco Institute, and the Director of the Puerto Rico Experiment Station of the United States Department of Agriculture.

As its part in this cooperative program the P. R. R. A. assigned from its rural rehabilitation funds the sum of \$118,650 for furnishing personnel, equipment and materials to carry out the coordinated activities.

An excellent example of the cooperation inaugurated by the program is the P. R. R. A.'s aid to the subsistence planting project of the Insular Department of Agriculture and Commerce. P. R. R. A.'s Rural Rehabilitation Division provided \$3,000 for the services of two supervisors and 18 inspectors to direct the subsistence planting project. This work is to be continued through the coming year. Various sugar mills and farmers donated 16,040 acres of land for development of this program, the objective of which is to enable needy and idle persons to obtain a plot of land upon which to grow subsistence crops.

In connection with the work of the Insular Agricultural Extension Service, an affiliate of the University of Puerto Rico, the P. R. R. A. has allotted funds for the appointment of 26 assistant agricultural agents to work under the Director of the Extension Service. They will assist in the development of 4-H Club work, soil conservation, commercial and subsistence crops, livestock and poultry, farm management and organization.

Home demonstration among resettlers has been expanded through the coordinated activities of the P. R. R. A. and the Insular Agricultural Extension Service. Thirteen home demonstration agents have been appointed. They give instruction in sewing, interior home improvement, exterior home beautification, home sanitation, handicraft, home accounts, vegetable gardening, livestock and poultry raising.

The work of five assistants in agricultural economics in developing the economic program of the Insular Agricultural Extension Service also has been made possible through the Program of Coordinated Activity, with money from the P. R. R. A.'s rural rehabilitation funds.

An assistant specialist in animal husbandry, devoting his activities to advising county agents with regard to poultry improvements, is a part of this program.

Cooperating with the Insular Agricultural Experiment Station, the P. R. R. A. has made possible personnel and equipment for the continuance of parasitological investigations.

In the search for substitute products in the coffee and tobacco regions, attention has been fixed upon the animal industry. The question of feed is paramount but, with P. R. R. A. aid, the Insular Agricultural Experiment Station is now experimenting with 22 grasses, the nutritional values of which are being tested at the School of Tropical Medicine.

For research projects on the pathology and physiology of the vanilla plant, conducted by the Department of Botany and Plant Pathology of the College of Agriculture, the P. R. R. A. has furnished the personnel and equipment. The P. R. R. A. has also furnished personnel to the Tobacco Institute of Puerto Rico for collecting certain statistical material with reference to that industry.

As a part of its cooperation with the Puerto Rico Agricultural Experiment Station of the United States Department of Agriculture, the P. R. R. A. has made possible further progress in the propagation of bamboo species believed to be industrially important to Puerto Rico. With P. R. R. A.-financed materials and labor, the Station has added 10 acres to the bamboo nursery beds and 30 additional species of bamboo were imported during the year.

Vanilla experiments at this Station were augmented with P. R. R. A. help in the Coordinated Program. Three additional acres of land in the Maricao Insular Forest have been cleared and prepared as experimental vanilla nurseries.

Work with perfume products also has been fostered by the P. R. R. A. The Station built a number of lath houses and provided them with photometers in order to study the effect of light intensity upon the oil-yielding lemon grass. Propagating material of lemon grass, ylang ylang, vetivert, and acacia farnesiana is now ready for distribution among island farmers.

Interesting accomplishments have been obtained with quinine plants at the Station. To the existing plantings at Maricao and Las Mesas, the P. R. R. A. made possible the addition of large seed beds during the year. The ample rainfall, good drainage, protection from the wind and the altitude (nearly 3,000 feet), provide excellent conditions for the production of quinine. In the line of medicinal plants, the Station is endeavoring to introduce coca into Puerto Rico.

Spice crops such as cloves, nutmeg, cinnamon and black pepper are in the preliminary stages of development. More than preliminary work has been done with Jamaica ginger, which is thriving in the Island and should prove a valuable cash crop.

COOPERATIVES

In an island where the swelling population depends almost entirely upon agriculture for a living, one of the biggest difficulties in the way of small-scale enterprise is the large corporation controlling large amounts of land and capital. One way for individuals to compete with large-scale operations is for groups of farmers and tradesmen to organize into cooperatives for the purpose of producing and marketing Puerto Rican products.

First and largest of these groups is the Lafayette Sugar Cooperative. It now has had two years of successful operation. The Lafayette central during the recent crop season produced from 222,436 tons of cane a total of 225,843 bags of sugar (250 pounds each), having an average yield of 12.794 pounds of sugar per 100 pounds of cane.

The leadership which Lafayette has shown in the matter of extracting valuable by-products from sugarcane is a striking example of the type of progress which is coming from Puerto Rico's cooperative groups of individuals.

Further progress in the P. R. R. A. sugar program was made when the organization of the Los Caños Sugar Cooperative was completed on March 10, 1939. The cooperative paid to the original owners, the Plazuela Sugar Co., for the mill and 42 acres surrounding the mill, a total of \$619,000 through a loan made by the P. R. R. A. The members of the cooperative either lease or own the 8,000 acres of land in the vicinity of the central. The P. R. R. A.'s loan was for the purchase of the mill and immediately surrounding acreage only.

Although the P. R. R. A. is setting up no specific program for resettlement in the Los Caños community, as was the case in the organization of Lafayette, the articles of incorporation for Los Caños call for the setting aside of a certain sum of money for community benefit after operating and replacement expenses have been paid.

It is intended to improve substantially the Los Caños mill and property before the start of the next grinding season. These improvements will entail an expenditure on the part of the cooperative members, of approximately \$200,000. During the crop season just ended Los Caños produced from 145,890 tons of cane 128,005 bags (250 pounds each) and 21,000 bags (100 pounds each) of raw sugar, having an average yield of 11.811 pounds of sugar per 100 pounds of cane. Proceeds for the crop year totaled \$51,004.49 (depreciation not deducted).

Cooperative groups are successfully reviving old industries as well as stimulating new ones. The growing of cotton in Puerto Rico died out with the closing of a thread company ginnery several years ago. But in 1935 the Puerto Rico Marketing Association for Minor Crops provided a mill and marketing facilities, and was so quick to pick up the thread of the old industry that today the Island is growing more cotton than ever before and the Cooperative is handling all cotton grown.

The marketing of Puerto Rican wild oranges in the United States had been stopped by embargo because of the fruit fly until this year when the Arecibo Fruit Growers' Cooperative prepared to market the oranges in the form of canned juice. These are but two examples of the manner in which cooperative groups have been able to revive dying industries and, on a small scale, make them pay.

In the true cooperative the producer controls his own purchase of supplies, planting, production and marketing. Thereby he shortens considerably the route between producer and consumer. The hope of the P. R. R. A. in sponsoring these cooperatives is that by helping the people to do these things for themselves through collective action, more of the consumer's dollar will be secured for the producer.

The P. R. R. A. Cooperative Division now works with 13 of the 15 cooperatives on the island. Three of these were financed by F. E. R. A. funds, 3 by the Insular Department of Agriculture, and seven have been organized and financed by the P. R. R. A.

Among the 13 there are 8 handling farm products. These include 3 for vegetables, 2 for sugar, and 1 each for tobacco, cotton and fruit. Of the remaining 5, one purchases farm supplies and the others handle needlework, earthenware, string rugs and novelties.

The fruit growers' cooperative at Arecibo has built, with P. R. R. A. loans, a \$52,000 cannery equipped with \$34,000 worth of machinery, and are using \$20,000 of P. R. R. A.-loaned money as working capital.

The purchasing cooperative, organized and financed by the P. R. R. A., bought more than 10,000 tons of fertilizer during the year for its members, among whom are all cooperatives using fertilizer. It is developing an excellent business in cattle feed. During the com-

ing year, it will add to its purchasing all the seed, crates, insecticides, and other supplies used by the P. R. R. A. vegetable cooperatives.

The manual arts cooperative is a P. R. R. A.-sponsored handcraft group which will market, through its own shop in San Juan, needlework, straw and wood products, and other art objects of shell and horn.

Among important plans for the coming year are those for the P. R. R. A.'s Castañer project of approximately 1,600 acres, which is being reorganized as three separate land cooperatives whose products will be marketed by a service cooperative. The manager of the latter will direct the cultivation of the land, the operation of the central service farm and the coffee-curing plant. Members of the land cooperatives will till the land collectively.

TABLE 1.—Cooperatives With Which the Division of Cooperatives of the PRRA is Working

Name	Financing agency	Year organized	Products	Members	Amount invested	Annual business
1. Cooperative Handcrafts, Inc., of Puerto Rico. ¹	F. E. R. A.	1936	Needlework ...	286	\$184,296.41	\$125,319.67
2. Primus Potteries Cooperative, Inc. ²	F. E. R. A.	1938	Earthenware...	42	29,529.86	-----
3. Puerto Rico Rug Cooperative, Inc.	F. E. R. A.	1938	String rugs....	202	2,500.00	1,095.08
4. Puerto Rico Tobacco Marketing Association.	Insular government.	1934	Tobacco.....	2,170	35,400.00	763,521.06
5. Puerto Rico Marketing Association for Minor Crops.	do.....	1935	Cotton.....	525	12,775.00	64,587.18
6. Arecibo Fruit Growers Cooperative Association.	P. R. R. A.	1937	Fruit.....	85	106,000.00	15,545.00
7. Sociedad Agrícola Cooperativa de Puerto Rico.	P. R. R. A.	1938	Farm supplies..	463	170,463.00	216,000.00
8. Cooperativa de Productores de Hortalizas de Jayuya, Inc. ⁴	P. R. R. A.	1937	Vegetables....	24	-----	6,493.00
9. Asociación Cooperativa de Trabajadores en Artes Manuales. ³	P. R. R. A.	1939	Handcraft.....	-----	20,000.00	-----
10. Asociación Cooperativa de Productores de Vegetales de Puerto Rico.	Insular government.	1930	Vegetables....	15	2,000.00	12,000.00
11. Asociación Azucarera Cooperativa Lafayette.	P. R. R. A.	1936	Sugar.....	454	4,976,434.71	2,043,634.48
12. Asociación Azucarera Cooperativa Los Caños.	P. R. R. A.	1939	Sugar.....	482	819,000.00	902,294.88
13. Cooperativa de Cosecheros de Vegetales de Río Grande. ^{3,4}	P. R. R. A.	1939	Vegetables....	23	-----	-----
Total.....	-----	-----	-----	4,771	6,858,398.98	4,150,490.35

¹ Cooperatives organized by Puerto Rico Self-Help Corporation with F. E. R. A. funds.

² Statistics not available.

³ Not in production.

⁴ Application for loan pending.

The Lafayette Sugar Cooperative is attempting to increase the growing of sugarcane despite quota restrictions. This is to be accomplished through the sale of sugarcane by-products, mainly butyl alcohol, for the manufacture of which a \$500,000 plant has been built at Lafayette. This plant will extract the alcohol from sugarcane residue by a fermentation process developed in Puerto Rico. As the

marketing of solvents increases, it is planned to increase the production of the plant. A number of solvents which may be obtained from sugarcane residue, namely acetone and glycerin, would be exceptionally valuable in case of war.

Coconut growers on the island, since coconuts can no longer be marketed as such, have petitioned the Insular Department of Agriculture, the Insular Agricultural Experiment Station and the P. R. R. A. to organize a cooperative for the processing of coconuts. One of the uses of the coconut husk is in the manufacture of gas masks.

The fishermen of Puerto Rico have requested the organization of a cooperative for the fishing industry. None of the individual fishermen has refrigeration facilities or marketing channels, and hence is placed more or less at the mercy of a few speculators. In the meantime the Island imports thousands of pounds of dried and frozen fish.

The growing of vanilla in Puerto Rico has reached such an advanced state, largely because of encouragement given growers by the P. R. R. A. through the construction of its pilot vanilla curing plant at Castañer, that the growers are asking for a cooperative to cure and market their product. It is planned to organize this group during the coming year.

A small vegetable growers' cooperative was set up some time ago by the Insular Agricultural Experiment Station. It is at present selling vegetables in New York and local markets. At the request of its members, it is now being reorganized by the P. R. R. A. Division of Cooperatives.

It will be noted that the P. R. R. A. cooperative work has spread over a large field. It was believed that only through this method of research could the true value of various types of cooperatives be determined. Future progress of the cooperative movement will depend largely upon the initiative and training of cooperative members. To add to that training and to encourage that initiative is the purpose of the P. R. R. A.'s cooperative division during the coming year.

RURAL REHABILITATION

Cornerstone of the P. R. R. A. program is its rural rehabilitation. The division handling this group of projects has been subdivided into sections supervising land utilization, soil conservation, agronomy and marketing, tick eradication and medical service.

LAND UTILIZATION

These sections are improving the knowledge of resettlers along the lines of modern agricultural practices; providing them with good seed, purebred swine, goats, and poultry; cooperating in the har-

vesting, classification, and marketing of their crops; and establishing necessary demonstrations of approved methods.

The central service farm operated in each large resettlement project is the center of activities. It serves as a practical school of agriculture for the resettlers as well as a center of distribution for seed and animals. In accordance with the program of coordinated activity established this year by the P. R. R. A. and other Insular and Federal agencies, benefits derived from the operation of central service farms also have been made available to farmers in general.

The land utilization sections supervise resettlers in the coffee, tobacco and fruit regions, where a total of 4,674 parcels of land has been acquired by the P. R. R. A. and upon which 667 houses, built by the P. R. R. A., are now occupied by resettlers.

In the eight large rural resettlement projects 2,598 houses have already been built, of which 2,209 are now occupied. A total of 541 houses was under construction at the end of the fiscal year and it is planned to build 2,000 additional resettlers' homes with the new funds assigned for the 1939-40 fiscal year.

Various utility improvements have been made for resettlers with an emphasis placed on waterworks. Water systems have been installed at seven of the resettlement projects and a number of deep wells have been drilled in several of the smaller projects.

The vanilla unit of the land utilization sections, cooperating with interested independent farmers, has secured a total planting of more than 300 acres of vanilla throughout the Island during the past year.

The P. R. R. A. has constructed a model pilot curing plant at Castañer Farm, to which the farmers have already sent 573 pounds of green vanilla beans. It is expected that during the coming year the plant will receive a ton or more of green beans as the growing of vanilla, a slow process, gets under way.

The planting of onions has been fostered by the P. R. R. A. among resettlers during the past year and 86 acres were successfully planted, harvested and locally marketed.

Plans have been made for setting out 110 acres of onions during the coming year. Onions have never been produced in Puerto Rico on a large enough scale to be called a cash crop but have been imported originally from Spain and more recently from the United States in large quantities.

SOIL CONSERVATION

In addition to the four areas established in 1938 on Federal-owned land, the demonstration of soil conservation and land utilization was inaugurated in the areas of Arroyo, Trujillo Alto and the

island of Vieques, where there are 75 P. R. R. A. resettlement farms. As a result of this expansion, a larger number of farmers received instructions and demonstrations. Two intensive research projects were maintained during the year, one in cooperation with the United States Agricultural Experiment Station at Mayaguez and the other with the Insular Agricultural Experiment Station at Rio Piedras. Employment was given to approximately 3,000 laborers and technical advisers during the year with the result that about 80 percent of the total allotment for soil conservation was spent for relief labor.

Proposed work in 1939-40 will be more extensive than in the past year as plans have been outlined, in cooperation with the Insular Agricultural Extension Service and other allied agencies, to carry out on lands now occupied by needy farmers the same type of program being followed on Federal property.

LIVESTOCK AND POULTRY

Aim of the P. R. R. A. poultry project has been to introduce a new breed of birds which would feather uniformly, mature rapidly, and begin to lay eggs or develop into broilers in the least possible time.

The main poultry breeding plant at La Plata, designed to house about 1,400 layers and pullets and 210 roosters, has an output of approximately 30,000 chicks per year, consists of 25 breeding pens, and 2 brooder houses, 1 office and a 2,663-egg incubator.

Since July 1937, the poultry project has produced 26,610 baby chicks, of which 8,800 were distributed to resettlers, 7,769 were sold to the public at broiler age, 176 were loaned to the Insular Government.

SWINE

The P. R. R. A. began its swine project in July 1937, in order to provide the P. R. R. A. resettlers with early maturity gilts and to foster the hog industry of the Island by supplanting the mongrel razorback native breed with a more economical animal. At the same time boars are kept at stud so that by cross-breeding there may be a systematic improvement of the common hog. In the P. R. R. A. swine herds at Castañer, La Plata, Lafayette, Marini, San Just, Vieques, Zaldondo, in the various vocational schools and at the University of Puerto Rico's Agricultural Extension Service farm, there are a total of 1,115 swine of which 785 are suckling pigs. The average farrow of the entire P. R. R. A. swine project has been approximately 9 pigs. During the past year 298 gilts were distributed among resettlers and 442 males were sold to farmers outside the jurisdiction of the P. R. R. A.

TICK ERADICATION

The purpose of the cattle tick eradication program, which has been developed by the P. R. R. A. with the Insular Department of Agriculture and Commerce and the Bureau of Animal Husbandry of the United States Department of Agriculture, is to eradicate the fever ticks affecting cattle in Puerto Rico, thereby improving the health of dairy herds and ultimately the quality of milk and meat products for the island.

To facilitate the program the Island was divided into western, central and eastern zones, each being separated by an established quarantine line. Eradication has been completed in the western zone. This year construction work was completed in the central zone and 226 vats have been built in the eastern zone, a total of 991 vats on the Island. Systematic eradication is now being conducted in 448 vats in the central zone where approximately 210,000 head of cattle, horses, oxen, and goats are being treated every 14 days.

MEDICAL CARE

P. R. R. A. medical experts have been instructing rural families in modern sanitation, conservation of health and preventive medicine.

Work has been performed through a number of dispensaries in both rural and urban sections as well as treatment units which travel from farm to farm in the agricultural projects of the P. R. R. A.

The dental service, manned by 3 full-time dentists and 5 part-time dentists, treated a total of 3,374 patients.

The treatment units of the medical section are in charge of inoculations. During the fiscal year more than 4,000 were inoculated for typhoid fever, 3,741 for smallpox, and nearly 2,000 for uncinaria. The control of malaria was also undertaken by the treatment units and more than 600 received this phase of medical protection. The work of the ambulatory units was supplemented by lectures and information for resettlers in matters of hygiene and sanitation.

The medical section also operated 21 dispensaries, of which 5 were urban and the rest rural. The combined results of the work of these dispensaries show that 2,272 persons were inoculated against typhoid fever; 759 were vaccinated and 87 revaccinated against smallpox; 210 persons treated for syphilis. The rural and urban dispensaries also treated 2,473 persons for malaria. A total of 7,597 physical examinations was performed.

In cooperation with the laboratories of the School of Tropical Medicine and the Insular Department of Health, the medical section carried on extensive tests of water supplies in the various P. R. R. A. resettlement areas. Incident to this work of sanitation and preven-

tive medicine, the medical section handled 78,565 compensation cases for the P. R. R. A. itself.

SOCIAL SERVICE

The political history of the Island tended to produce among Puerto Rico's rural folk an accepted limitation of the possibilities in life. Officials of the P. R. R. A. discovered a complete lack of opportunities for adult education, recreation or cultural development when projects of reconstruction first were inaugurated in the rural zones. Purposely, the P. R. R. A.'s social service has gone hand in hand with its rural rehabilitation.

Aim of Social Service is to create among resettlement families the ideals of citizenship, to further mutual understanding and to foster constructive work; attempting thereby to improve the individual's habits, through those habits to improve the family, and through the family to improve the community.

Social Service conducts its work through 14 community centers located in the P. R. R. A. rural projects. Social workers in charge of community centers are assisted by an athletic director and a teacher who conducts the kindergarten and classes in sewing and other avocations.

Seventy-nine clubs and 158 athletic teams carry on social service activities. Social Service workers have conducted 22,998 office interviews with members of resettler families who have come for advice and help. They have made 12,696 visits to homesteaders. The boxing rings, athletic fields, theaters, games, kindergartens, sewing classes, etc., which make up the various community centers, were used by thousands of men and women during the year.

Advice in the proper methods of preparing meals, balancing of diets, care of children, consultation as to appropriate reading material for adults as well as children and the general supervision of social life in the communities of the P. R. R. A. resettlement projects are among the details of this valuable service.

HOUSING MANAGEMENT

Total rental collections from all P. R. R. A. housing projects (average rents range from \$7.91 to \$12.57) during the fiscal year amounted to \$209,045.02 as against total obligations of \$124,307.76, leaving a net return of \$84,737.26 or a percentage of 59.48 of total obligations to income. This was a substantial gain over the previous year when total rental collections of \$44,141.32 against total obligations of \$40,410.26 presented a percentage of 91 of obligations to income.

At the end of the fiscal year P. R. R. A. housing developments were well occupied. Among urban projects the Falansterio, consisting

of 216 living units, was 99.07 percent occupied; Eleanor Roosevelt development of 471 units, 95.75 percent; Juan Morell Campos development of 150 units, 93.33 percent; Mirapalmeras project of 131 units, 100 percent; and La Granja project of 78 units, 100 percent.

Of the larger projects in the rural zones the American Suppliers of 459 units, was 96.95 percent occupied; San Just project of 263 units, 93.15 percent; Castañer Farm project of 200 units, 100 percent; Lafayette project of 718 units, 85.09 percent; and the Coffee, Tobacco, and Fruit project of 883 units, 72.14 percent.

During the fiscal year new community centers were built at the Eleanor Roosevelt development (where 26 new houses were constructed), the Juan Morell Campos development and the Mirapalmeras development. Each of these centers contains space for the director, kindergarten, workshop, clubroom for tenants' meetings, and an office for physician and nurse.

FORESTRY

The Insular Forestry Service, the United States Forestry Service, and the P. R. R. A. Forestry Division are working together on the general forestry program for Puerto Rico. Land quotas set up at the beginning of the program, for the purchase of forest lands, include for the Insular Service 50,000 acres, of which 39,190 acres have been purchased to date; for the Federal Service, 100,000 acres, of which 26,000 acres have been bought; for the P. R. R. A. Division 100,000 acres, of which 24,000 acres have been purchased.

Approximately one-fourth of the land area of Puerto Rico, amounting to 500,000 acres, is so steep, rocky and eroded as to be of little value in agriculture. The general forestry program has aimed at the purchase, development and management by government agencies of at least one-half of this area as public forests for the purposes of increasing the income of non-agricultural lands, preventing soil erosion not only on the non-agricultural lands but also on the agricultural lands below them and regulating run-off and stream flow to increase the efficiency of hydroelectric plants and irrigation services.

One of the most promising rehabilitation activities of the past year has been the establishment of forest homesteads (parceleros) in various forest areas. Every large tract of forest land has been mapped to show the three classes of land contained—first, small scattered areas of good agricultural soil, rarely exceeding 5 percent of the gross area; second, large areas of submarginal or agricultural forest land, amounting to from 10 percent to 20 percent of the gross area, on which restricted cultivation is possible only when combined with the growing of forest trees; and third, pure forest land with no agricultural possibilities.

Residence and cultivation permits are issued free of charge for from 5 to 10 acres of land, including a proportionate amount of each class of soil. In return for the privilege of residing and raising food crops on the land, permittees must reforest 2 acres of non-agricultural land. Additional benefits given the permittee include free native material from the forest with which to construct and repair houses and other farm improvements, and part-time employment not exceeding 2 weeks per month on nearby forestry projects. As they become available, materials from the forest, from which charcoal, stakes, posts, and other wooden products may be manufactured and sold, will be wholesaled to the permittee as a means of increasing his income.

As this activity increases, it will replace Government employment. The system will eventually make each forest unit self-supporting and will provide a permanent home and living for several thousand families. During the fiscal year just ended 250 additional families were established on 409 acres of forestry land. The accumulative total at the end of the year was 700 families on 2,148 acres. Additional permits are being issued as rapidly as suitable lands can be made available.

A total of 3,991.24 acres of land costing \$50,260.61 was purchased during the year, bringing the total land purchase to 22,672.56 acres at a cost of \$294,287.79 or \$12.22 per acre.

The three large nurseries in Rio Piedras, Cayey and Mayaguez were abandoned this year except for part-time use. Small local nurseries, established on each forest unit, produced a total of 2,000,000 trees. Total production of 4,000,000 trees this year cost \$5 per thousand. Up to June 30, 1939, approximately 18,000,000 trees had been produced for less than \$5 per thousand.

Plantation maintenance work during the year covered 7,858 acres at a cost of \$10.20 per acre. New plantations were established on 569 acres of newly acquired land, costing slightly more than \$21 per acre. The total net area planted by the end of the fiscal year was 7,858 acres, costing less than \$50 per acre for original planting and maintenance.

A total of 10.46 miles of roads, costing \$9,550 per mile, was constructed during the year. These low standard development roads are necessary to make land accessible for planting, protection and administration. A total of 27.9 miles of trails was constructed during the year at an average cost of \$130 per mile. Boundary surveys and monumentation of 69.75 miles of forest land were made during the year, bringing the total surveyed to date to 102.53 miles. These surveys help prevent trespass, adverse claims and boundary disputes in the future.

ENGINEERING

Public health, social service, housing, education, transportation and industry were among the purposes served by the construction and

repair program of the P. R. R. A.'s Engineering Division during the fiscal year.

The Division administered 81 projects, 44 of which were done under contract and 37 by the P. R. R. A. force. Work done on 37 projects by the P. R. R. A. force totaled an expenditure of \$3,257,858.20; that on 44 projects under contract, \$1,682,770.65.

Projects at the School of Tropical Medicine, considered one of the outstanding institutions of its kind in the world, constituted the largest expenditure in the Engineering Division allocations, a total of \$456,780.95.

These projects included partial construction of the School's three-story concrete library building; four-story concrete laboratory building; ventilation and air-conditioning, and vitreous wall and floor tile installation for the School's hospital.

For the completion of a new auditorium, other buildings and improvements at the University of Puerto Rico, the Division expended \$453,346.58. This included partial construction of four-story concrete engineering building of the University's College of Agriculture and Mechanic Arts in Mayaguez.

A total of \$560,000 of W. P. A. funds was administered by the P. R. R. A. for the reconstruction of ancient fortresses and works at El Morro and for other improvements for the Army.

Two one-story concrete R. O. T. C. armories, one at Rio Piedras (\$89,400) and one at Mayaguez (\$56,100) were partially completed. Practically finished are two new wings on the Insular Police headquarters (\$41,000) in San Juan. A headquarters building for Insular Police was constructed at Coamo (\$12,000). Excepting mill work, the pilot plant for the Puerto Rico Tobacco Institute in Rio Piedras (\$17,160) has been finished. A Home for Aged Women (\$61,250) has been partially completed.

Completing the Insular Home for Boys at Guaynabo, which consists of four two-story concrete dormitories, a two-story concrete dining hall containing extra classrooms, a concrete vocational school, and a concrete infirmary building, required an expenditure of \$386,273.91.

Important were the central service farm projects under which \$31,568.33 was spent for storehouses, community centers, stables, garages, mill shops, breeder houses, incubators, water-supply systems, etc., appurtenant to the central service farms. A total of \$125,000 was spent for the construction of 1,200 animal-shed sets consisting each of a granary, chicken coop and hog pen for the farmers' houses.

Rural and urban schools numbering 53 concrete buildings comprising 131 classrooms were built during the year at a cost of \$1,843,697.35. This project included nine schools started the previous year, which were finished. Repairs to rural and urban schools totaled \$71,000.

From an appropriation of \$100,000, four concrete vocational schools and a second story for the Eleanor Roosevelt School were started. A total of \$2,000 was spent for repairs to vocational schools built previously by the P. R. R. A.

Twenty-six concrete urban houses were built at the Eleanor Roosevelt housing development. A total of 543 rural farmer's houses were built during the year and 541 were under construction on June 30, 1939.

Important to the general health conditions and especially to the checking of malaria were the swamp drainage and filling on 28 projects (\$1,111,000) throughout the Island. An extensive project of swamp drainage, filling and piping at Arroyo in the vicinity of the Lafayette Sugar Cooperative cost \$113,862.50.

A model medical dispensary was constructed for the municipality of Arroyo during the year, at a cost of \$48,181.99. By special arrangement with the nearby Lafayette Sugar Cooperative, the municipality has turned over operation of the hospital to the Cooperative.

Water-supply systems installed in 15 resettlements on Federal land were built for \$64,236.02. This was in addition to the completion of three municipal water-works systems totaling \$8,025 68.

For buildings, garages, sewer and water systems for the United States Naval Radio Station in San Juan, the P. R. R. A. spent \$85,000. This amount included also a water and drainage system for the Navy property on Culebra Island.

On P. R. R. A. resettlement projects a total of 19 kilometers of macadam roads, 9 kilometers of trails, and 5.4 kilometers of grading were completed under an allotment of \$11,000. Roads on Federal property or gaining access to Federal property from insular or municipal roads totaling 18.4 kilometers were constructed under an allotment of \$175,000. Included also were 11 kilometers of trails, 7.8 kilometers of grading and 2.2 kilometers of streets (macadam).

The Division's aerial map unit supplies hundreds of prints to various Federal, Insular and municipal agencies. The survey unit completed 1,437 survey cases covering 13,941.72 acres of land. The average employment of the Engineering Division throughout the year was 11,807. The total expenditure of the Division was \$4,940,628.85.

RURAL ELECTRIFICATION

This project of the P. R. R. A., designed to aid the Insular Government in the development of the Island's natural resources, aims at ultimately replacing, to the largest extent possible, other forms of fuel with water power.

Three projects, Toro Negro No. 1, Toro Negro No. 2 and El Carite No. 3, have been completed to date and have a total power

potentiality of 40,000,000 kilowatt-hours. A fourth project, Las Garzas, partially completed, was transferred to the Insular Government in December 1938, since negotiations were under way at that time to secure a loan and grant from the P. W. A. to complete the project. The request has since been approved. The fifth project, Dos Bocas, is still under construction by the P. R. R. A.

Extensive studies of rainfall and run-off statistics have proved the P. R. R. A. hydroelectric projects to be economically sound and capable of earning an adequate return on investment.

Work accomplished on the Garzas project during the year up to the time when activities were suspended by the P. R. R. A. included the construction of the diversion tunnel; stripping of the river bed at the dam location; construction of core walls in the dam foundation across the river channel; excavation of the power tunnel to within 2,524 feet of completion; and miscellaneous activities such as the construction of the surge shaft near the outlet portal, Rio Chiquito diversion channel, and excavation for the switchyard, power plant and penstock foundations.

During the fiscal year construction activities on the Dos Bocas project included excavation on both east and west main dam abutments, spillway apron and retaining walls, penstock and powerhouse.

One section of cofferdam No. 2 was completed in June. About 35,000 cubic yards of concrete were placed in the dam and approximately 5,000 cubic yards in the spillway apron and west retaining wall. Work on the 4.5-kilometer road to replace part of Insular Road No. 6, which will be inundated by the reservoir, was advanced to 70 percent of completion.

Installation was completed on the 25-ton cableway and the crushing and screening plant. A concrete mixing plant was completed in November and the entire construction plant was being efficiently operated by the end of the fiscal year.

As much labor as was practical was utilized on this project. In the concrete pouring work, three shifts were employed most of the time. The monthly average of men employed varied from 185 to 1,677, the yearly average being 1,200.

Plans for the 1939-40 fiscal year include the continuance of the following activities at the Dos Bocas project: diversion of the river during the construction of the dam, excavation and concreting of main dam structure, spillway apron and retaining walls, construction of penstock at sluices, and relocation of the highway.

THE FUTURE

No one who views the Puerto Rican situation through realistic eyes can say that the aspect of the Island's immediate future is a pleasant one.

There are evidences on every hand of splendid beginnings in reconstruction and rehabilitation. There are more signs of success and happiness, fewer signs of destitution than in years. However, it took centuries to produce the condition which the P. R. R. A. is attempting to help rectify and it will take many more years before the Island is back on its feet economically.

The immediate need is serious. Thousands have been deprived of employment through the establishment of the quotas in the sugar industry. The sudden application of the Fair Labor Standards Act to Puerto Rico has violently disrupted its industries, notably needlework. A reexamination and revision of this legislation as it affects the peculiar economy of Puerto Rico would go far toward aiding the Island in the solution of its own economic problems.

Fundamentally, the basic problem of Puerto Rico is that of finding a way to supply an increased income to support its population on a standard of living commensurate with its American citizenship. This means full utilization of its tropical resources in such a manner as to supplement and complement rather than compete with agriculture and industry on the mainland. Only in part can this be accomplished by a program of relief spending. A more fundamental recommendation by this Administration is the coordination of agricultural and industrial development and the provision of proper credit facilities for Puerto Rico's farmers and tradesmen.

If capital can be made available to eligible Puerto Rican farmers and business men for the next few years, the hope is that Puerto Rico's economy will reach a stable level.

PETROLEUM CONSERVATION DIVISION

George W. Holland, *Director*

THE PETROLEUM CONSERVATION DIVISION was established to assist the Secretary of the Interior in administering the Act of February 22, 1935, 49 Stat. 30, the so-called Connally law; to cooperate with the Interstate Oil Compact Commission and the oil- and gas-producing States in the prevention of waste in oil and gas production and in the adoption of uniform oil- and gas-conservation laws and regulations and to keep informed currently as to the movement of petroleum and petroleum products in interstate commerce, in order to be in position to report to the President a lack of parity between the supply of and the consumptive demand for petroleum and petroleum products.

The Connally law was to have expired June 30, 1939, but by an act of Congress approved June 29, 1939, it was extended to June 30, 1942. This law regulates interstate and foreign commerce in petroleum and petroleum products by prohibiting shipment in such commerce of petroleum and its products produced in violation of State law. By Executive Order petroleum or petroleum products shipped from Louisiana or Texas ports are required to be reported. Likewise, the discharge of these cargoes in the United States also is required to be reported. During the fiscal year, 12,722 reports on shipments were received and handled by the Division.

OPERATIONS IN THE EAST TEXAS AREA

Federal Tender Board No. 1 operates in a designated area known as the East Texas oil field and is required upon application to issue certificates of clearance, or tenders, permitting the shipment in interstate commerce of petroleum or petroleum products whenever it determines that the petroleum or petroleum products do not constitute contraband oil as defined in the act.

During the fiscal year, 4,708 applications for tenders, of which 3,643 were for 192,467,730 barrels of crude oil and 1,065 for 21,018,814 barrels of petroleum products, were received and considered. At the beginning of the period there were 19 tenders for crude oil and 2 tenders for products pending; consequently, the Board took action

on 4,729 tenders. It did not approve 60 tenders amounting to 350,244 barrels of crude oil and one tender for 250 barrels of products. At the end of the period there were pending 13 tenders for crude petroleum, amounting to 127,197 barrels, and one tender for products amounting to 624 barrels. During the year crude-oil tenders were reduced before approval by 1,737,319 barrels and products tenders by 121,287 barrels. The aggregate quantity of petroleum approved for shipment in interstate commerce was substantially larger than that actually produced in the east Texas field, owing to the retendering monthly of legally produced oil held in storage and oil previously tendered but not shipped, the approval of tenders covering oil produced elsewhere but received in the East Texas area, and the issuance of tenders on oil interchanged between companies operating in the area.

During the fiscal year the reported actual production of petroleum in the east Texas field was 142,906,798 barrels, or 391,500 barrels daily; withdrawals of east Texas crude oil from field storage totaled 383,315 barrels; and 121,712 barrels received from reclamation plants and other similar sources, making a total of 143,411,825 barrels. Of this amount, 138,285,609 barrels, or 96.43 percent, was shipped from the area through the 13 trunk pipe lines; 5,080,515 barrels, or 3.54 percent, was received for processing at refineries located in the field; and the balance of 45,701 barrels, or .03 percent, includes crude used in the field, inventory adjustments, and losses.

There were 25,858 producing oil wells in the East Texas field on June 30, 1939, of which 903 were completed during the fiscal year, as compared with 2,457 new wells completed during the previous fiscal year. The average well density of the field was increased from one well to 5.2 acres on June 30, 1938, to one well per 5.1 acres on June 30, 1939. The average reservoir pressure declined from 1,120.84 pounds per square inch on June 8, 1938, to 1,085.08 pounds per square inch on June 10, 1939, a decrease of 35.76 pounds. An average of approximately 4,000,000 barrels of crude oil was produced for each pound of decline in reservoir pressure as compared with 3,740,000 barrels for the preceding year.

Eight refineries were operating on Federal tenders in the East Texas field at the beginning of the fiscal year. These plants processed 6,120,163 barrels of crude oil, of which 5,118,161 barrels, or 84 percent, was obtained from the East Texas field, and 1,002,002 barrels, or 16 percent, was obtained from other fields. All of the crude oil from sources other than the East Texas oil field was run to stills during the first eight months of the fiscal year. East Texas crude constituted their sole source of supply during the remainder of the fiscal year.

Summary of East Texas Refinery Operations, 1939 Fiscal Year

	Barrels	Percent
East Texas crude charged to stills.....	5, 118, 161	83. 63
Southwest Texas crude charged to stills.....	72, 499	1. 18
Louisiana crude charged to stills.....	852, 689	13. 93
Arkansas crude charged to stills.....	66, 466	1. 09
Gas well distillate and other Texas crude charged to stills.....	10, 348	. 17
Total crude distilled.....	6, 120, 163	100. 00
Products manufactured:		
Gasoline and naphthas.....	3, 519, 122	57. 50
Kerosene.....	366, 777	5. 99
Gas oils and distillates.....	240, 480	3. 93
Fuel oil.....	1, 352, 143	22. 09
Unfinished oils.....	359, 385	5. 87
Losses in refining.....	282, 256	4. 62
Total.....	6, 120, 163	100. 00

Sixteen natural gasoline plants connected to 24,168 wells on June 30, 1939, reported operations to Federal Tender Board No. 1 during the fiscal year. These plants processed 46,249,778 m.c.f. of lease and still gas and manufactured a total of 6,722,181 barrels of products. This represents an average of 6.09 gallons of natural gasoline, butane and propane per m.c.f. of gas processed, as compared with 5.5 gallons during the previous fiscal year. The average gas-oil ratio of the 24,168 wells connected to these plants during the fiscal year was 336.71 cubic feet per barrel of crude oil.

EXAMINATIONS OUTSIDE OF THE EAST TEXAS AREA

During the fiscal year the Secretary of the Interior authorized several investigations outside the East Texas area. The examination, authorized April 21, 1938, of the oil proration procedure in the States of Arkansas, Kansas, Louisiana, New Mexico, Oklahoma, and Texas for the purpose of determining the manner in which such procedure affects the administration of the Connally law and contributes to the ultimate recovery of oil and gas resources was completed during the fiscal year by Federal Tender Board No. 1. On July 23, 1938, an investigation of operating conditions in the KMA area, Wichita and Ocean Counties, Tex., with particular attention to the possibility of violations of the Connally law, was authorized. On April 3, 1939, an investigation of the LaBelle field, Texas, was authorized. On April 25, 1939, investigations to determine whether any contraband oil was being shipped from the Old Ocean field, Yates field, Plymouth field and the Corpus Christi area, Texas, were authorized. On May 24, 1939, a preliminary investigation concerning oil production methods in Michigan was authorized. During the fiscal year members of the Petroleum Conservation Division testified before legislative committees concerned with proposed legislation on petroleum conservation in California and Illinois.

REPORTS ON PETROLEUM SHIPMENTS BY WATER

The methods used in reporting and checking on petroleum shipments by water as outlined in the Annual Report of the Secretary of the Interior for 1938 have been continued. These reports covering the loading of cargo of petroleum or petroleum products provide the procedure for checking a substantial portion of the petroleum shipped in commerce in Louisiana and Texas.

COST OF ADMINISTRATION

The administration of the Connally law is essentially a field activity. Of the 83 persons employed at the close of the fiscal year, 69 were in the field and 14 in Washington.

The following table shows the expenditures made of available funds:

Personal Services:		<i>Appropriation</i>
Petroleum Conservation Division-----		\$42,516
Federal Tender Board No. 1-----		179,912
Total-----		<u>222,428</u>
Miscellaneous:		
Materials and supplies-----		11,425
Communications-----		2,032
Travel-----		8,042
Transportation of things-----		455
Printing and binding-----		952
Rent of buildings-----		6,600
Equipment-----		5,824
Total-----		<u>35,330</u>
Total obligated-----		257,758
Unobligated-----		2,242
Total funds available-----		<u>260,000</u>

OFFICE OF EXHIBITS

G. C. Dickens, *Supervisor*

GOVERNMENT participation through presentations at national and international expositions, State fairs, and at scientific and educational conventions, has become an established policy. One important function of all Government Departments and independent establishments should be to acquaint the general public with the numerous and varied services being carried on by them for the benefit of the people.

Experience has proved that one of the most satisfactory methods of informing the public is through participation in expositions, fairs, and this type of event. In this work the use of motion pictures, animated dioramas, cycloramas, and panoramas, models, stereopticon slides, colored transparencies and murals, has proved to be highly successful. In making presentations relating to our island and Territorial possessions and the American Indian, experience has proved that the display of native handicraft is essential.

During the past year the Office of Exhibits of the Department of the Interior designed and constructed the complete conservation exhibit, and six dioramas for the foods exhibit, which are on display in the Federal Building at the New York World's Fair. The Office likewise designed and constructed an animated (also day and night effects) diorama of Juneau, Alaska, which has been displayed at various travel exhibits.

At the present time, the Office of Exhibits is finishing the construction of a large diorama of San Juan, Puerto Rico, which will have animation and day and night effects. This exhibit is being made for the Institute of Tourism, Government of Puerto Rico, and will be displayed in the Puerto Rico Pavilion at the New York World's Fair. At other times it will be displayed at various points throughout the country for the purpose of stimulating and increasing travel to Puerto Rico.

The Office of Exhibits is likewise finishing a series of four dioramas for the Division of Education of the Office of Indian Affairs, which will be used in educational work among the Navajo Indians, and is designing and constructing two exhibits for the Bonneville project. One of these will be an animated diorama model of Bonneville Dam

itself, showing the power plant, locks, fish ladders, and the like. The other will be a lighted and animated map of the Pacific Northwest, showing transmission lines, the locations of various mineral resources, etc.

Only recently the Office designed and constructed a "Future Farmers of America" exhibit for the Office of Education.

Another important feature of the work of the Office of Exhibits involves assistance to the various bureaus and divisions of the Department in executing plans relating to miscellaneous small exhibits throughout the country, and in designing large exhibits that will effectively portray the activities and functions of the various Bureaus and Divisions.

In addition to its regular work of designing and constructing Departmental exhibits, the Office of Exhibits during the past year has furnished considerable material for display at various travel and outdoor-life shows in this country, and in London. The demands for attractive and informative Department of the Interior exhibit material for display at expositions, fairs, conventions, and travel and out-door life shows is constantly increasing.

CIVILIAN CONSERVATION CORPS

FIVE agencies of the Department continued, during the fiscal year, to supervise the work of Civilian Conservation Corps camps assigned to various types of conservation projects throughout the country. These Bureaus supervised the work of an average of 438 camps during the year. Detailed reports on C. C. C. activities of the various Bureaus will be found in the respective Bureau reports.

In addition to its C. C. C. work to control Federal coal deposit outcrop fires in Wyoming, with which it has been occupied since 1933, the General Land Office assumed technical supervision of four new camps established on the Oregon and California Revested Lands in Oregon. These camps are engaged in general forest conservation work to assist the Oregon and California Administration in administering these lands on a sustained yield basis for the purpose of providing a continuous crop of forest products for the benefit of local communities. In addition to fire suppression and fire protection improvements, the principal work of these camps is the construction of a permanent transportation system to permit the most efficient conservation of the timber resources through a planned sustained yield program. Without a planned road system, the forests closest to the markets are exploited without provision for future crops. Under such a method, two or three cuttings would probably be made on the same area before the less accessible timber would be

utilized. This would result not only in removing the young trees just when they reach an age to put on valuable growth, but also in the more disastrous practice of repeated slashing fires which destroy the seed source and ruin the soil for natural reforestation. By having a road system in existence, the young and thrifty forest can be left to reach maturity, while the older and more decadent stands can be utilized to supply the demands of industry.

The work of the Oregon and California C. C. C. camps is considered to be a sound financial undertaking. It is of untold value and the cost of operation of the camps will eventually be realized many times by the country through increased timber values and more efficient utilization.

A total of 27 miles of truck trails were constructed during the fiscal year, and the camps worked on 72 forest fires which covered a total of 39,000 acres. One lookout tower was constructed and a total of 27 miles of forest protection telephone line was strung in addition to 40 miles of line maintained and improved. In the spring, 400,000 trees were planted on 500 acres of cut-over, deforested land. One hundred and fifty seed beds were planted which will produce approximately 250,000 trees for field planting in 2 years. Fire hazard reduction work was done along 32 miles of roads and on 910 acres of forest land. For further utilization of the lands, certain camping and picnicking facilities were built. Approximately 120 miles of fire-protection truck trails were maintained and improved.

The Wyoming coal outcrop fire work continued on 13 projects, including the reconditioning of older projects and construction of truck trails leading to various other projects. In the execution of this work a total of 293,812 cubic yards of earth, coal, shale, and burning material were removed. Control of the fires involves removal of burning material where possible, and filling of all cracks in the surface with fine earth or sand. Terracing is used extensively to insure proper and uniform cover of fire areas. Small check dams are also used to prevent washing away of the toes of slopes.

The Office of Indian Affairs carried forward with C. C. C. projects on 71 Indian reservations, continuing operations for the building of basic structures for conservation of land and water, and preservation of forest stands and forage cover of the reservation lands for the protection of the great national watersheds.

Improvements completed by Indian enrollees are rapidly being incorporated into the advancing economic life of the Indian people. Although at first emphasis was placed upon improvement of forest protection and development of range resources, as the more urgent needs for such facilities were satisfied attention was given to various

activities to enhance the value of Indian lands or contribute to the social welfare, happiness, and contentment of the people.

Many dams constructed are serving the dual purposes of supplying water for range stock and irrigation water for subsistence gardens on the lands below. Lands heretofore open and exposed to trespass are protected by hundreds of miles of new and rebuilt fences. Lookout towers, trails, telephone lines, and radio facilities, augmenting trained crews of C. C. C. enrollees, have brought fire detection and suppression to a state of preparedness undreamed of 6 years ago.

Indian C. C. C. activities resulted, during the fiscal year, in the construction of 500 springs, small reservoirs, and well development jobs; 115 impounding and large diversion dams; 950 miles of fences; 900 miles of truck and horse trails, and advancement of insect and tree pest control over 100,000 acres.

Not only have thousands of Indians obtained the current necessities of life through the C. C. C. program, but hundreds of Indian homes today contain facilities and furnishings purchased from the wages received by enrollees, and in many instances a substantial portion of the cost of new homes has been met from savings accumulated from C. C. C. wages.

Under technical supervision of the Bureau of Reclamation, C. C. C. camps continued their work for rehabilitation of Federal reclamation projects, development of supplemental water supplies, construction of new reclamation projects, and development of recreational facilities at irrigation reservoirs. The number of camps on reclamation projects was increased from 35 to 44, permitting the undertaking of several new projects of importance. Foremost of these is the construction of the Deschutes project in central Oregon, designed to save, through irrigation, a well developed dry-farming community of 50,000 acres.

The C. C. C. rehabilitation programs made excellent progress. They include replacement of deteriorated water-control structures with concrete structures; lining of porous sections of canals with concrete; rock riprapping of canals where erosion is serious; construction of water-measuring devices and improvement of operating facilities. The better physical condition of the reclamation projects resulting from these permanent improvements is reflected in increased savings of irrigation water, a conservation matter of vital importance to the farming regions of the far West.

The National Park Service continued its cooperation with the States and its direction of C. C. C. projects for the protection, conservation, and development of park and recreation areas in all parts of the country. During the fiscal year operations were carried on by an average of 54,410 enrollees in 311 camps, including 91 in con-

tinental national parks and 220 in State, county, and metropolitan parks and recreation areas and Federal recreational demonstration areas. Work considered sufficient for present recreational needs was completed during the fiscal year on 27 State, county, and metropolitan parks. Besides general conservation treatment, such operations in both national, State, and local areas includes construction of roads and trails, bridges, park buildings, and other facilities for administration and use.

The Department was assigned 1,600 enrollees for projects in the territories and insular possessions, including Hawaii, Alaska, and the Virgin Islands. In the Territory of Hawaii the enrolled strength was increased by 100 over the previous year, and of the total of 900 authorized, 225 were assigned to projects in Hawaii National Park and 675 were employed on lands under the jurisdiction of the territorial government.

Five hundred enrollees assigned to the Virgin Islands carried forward projects on the Island of St. John in addition to work previously inaugurated on St. Thomas and St. Croix. Their operations included nursery work, such as seed collection and field planting; road and trail work, erection of telephone lines, fencing of important areas to prevent wild goats, sheep, and boars from destroying vegetation; fire-hazard reduction and other conservation measures.

At Mount McKinley National Park, Alaska, summer work was continued by a 200-man company transported from the States for the second season of occupation. Fire-hazard reduction, construction of minor roads, and sanitary facilities were among the chief projects.

On recreational demonstration areas, some 3,000 enrollees continued projects for construction of organized camping buildings and facilities and general conservation treatment of the Federal areas. Facilities for both group camping and day use are taking shape under their hands.

The peak of productiveness and accomplishments was reached in the spring of 1939 by camps assigned to the Grazing Service for conservation projects on the Nation's public range lands. The Division's full quota of 90 camps was attained in November 1938 for improvement work in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming.

These projects, designed to aid stockmen who themselves contribute to support of the range, include spring developments, wells for water storage, rodent control, construction of range fences, cattle guards, stock driveways, etc. The C. C. C., under the Grazing

Service, has constructed projects far beyond the scope or resources of any individual or group and consequently has made possible the steady improvement and rehabilitation of the range. This program has also proved of inestimable value to livestock owners as a whole and doubtless has gone a long way to assist in the stabilization of the industry.

The Department continued its work of education and training for C. C. C. enrollees in order to give them a better understanding of their jobs and fit them for employment after leaving the Corps. Efforts were also increased to promote the safety of enrollees on the job and in camp, and substantial reductions in the frequency and severity of accidents were reported generally throughout camps under the Department of the Interior.

OFFICE OF ADVISER ON NEGRO AFFAIRS

W. J. Trent, Jr., *Adviser*

THE activities of the Office of Adviser on Negro Affairs during the fiscal year may be divided into two groups, namely, those matters which concern the Department of the Interior and those which concern the Public Works Administration.

DEPARTMENT OF THE INTERIOR

In the Department of the Interior the majority of the work of the Adviser on Negro Affairs had to do with the integration of Negro citizens into the expanding program of recreational facilities sponsored and developed by the National Park Service. This expansion took the form of Recreational Demonstration Areas and provision of other recreational facilities in parks in Southern States.

During the past year this office worked toward and aided in carrying out the plans proposed in 1938 to develop several recreational demonstration areas for Negro use. As a result, three new areas were opened for the 1939 season: Swift Creek near Richmond, Va., Lake Murray near Ardmore, Okla., and Cuivre River near St. Louis, Mo. This makes a total of five areas in operation during the 1939 camping season. Field trips were made to other areas to determine the need and feasibility of developing similar areas. Plans were put forth and work undertaken for the development of other areas in Kentucky, North Carolina, and Maryland.

With the great expansion of the recreational program in the national parks in the Southern States, this office submitted memoranda and participated in conferences with officials of the Department on the question of the policy regarding such facilities in that section of the country.

It also consulted with the Branch of Buildings Management of the National Park Service on personnel problems within the custodial force. Investigations were initiated and recommendations made to decrease the possibility of discriminatory action against Negro workers.

In November 1938, the Adviser investigated charges of discrimination on the Grand Coulee Dam project. As a result of this trip and negotiations entered into, the situation improved slightly and more

Negroes were given job opportunities. Monthly reports which show the actual number of Negro workers employed are rendered to the office by the Bureau of Reclamation.

PUBLIC WORKS ADMINISTRATION

Under the 1938 P. W. A. program this office has concentrated on three main problems: (1) The review and recommendation of applications for funds for Negro schools and hospitals in the South; (2) personnel adjustments; and (3) investigation of alleged labor discrimination on the projects in violation of the agreement between the Public Works Administration and the public agency.

In keeping with the express policy of the Administrator, applications involving grants for Negro schools in the South were reviewed by this office and recommended for consideration in order that the great lack of adequate facilities might be improved through the aid of the Public Works Administration.

This office also consulted with and advised the Assistant Administrator and Executive Assistant to the Administrator on the difficulty of Negro employees in securing promotions and reclassifications. During the year this situation improved greatly. In cases where instances of discrimination had been voiced, the Adviser initiated investigations and reviewed corrective measures undertaken.

In conjunction with the Labor Relations Division, the Adviser on Negro Affairs made investigations of alleged discrimination against Negro workers on P. W. A. jobs. The following cities were visited for such investigations: New York, N. Y., Pittsburgh, Pa., St. Louis, Mo., Philadelphia, Pa., Chicago, Ill., Nashville, Tenn., Raleigh, N. C., Atlanta, Ga., and Seattle, Wash.

OTHER ACTIVITIES

One of the tasks of the Adviser on Negro Affairs was to analyze data and compile information from the material gathered through the medium of the Survey of the Training and Employment of White-Collar and Skilled Negro Workers sponsored by this office in 1936. During 1938, 25 clerks and statisticians were assigned to the office by the Works Progress Administration for the purpose of preparing data for the third volume of the study. The second volume, *The Male Negro Skilled Worker in the United States, 1930-36*, was prepared by Dr. Robert C. Weaver, formerly Adviser on Negro Affairs. It is in press at the present time. It is expected that the third volume, *The Urban White-Collar Worker, 1936*, will be ready by June 1940.

The Adviser on Negro Affairs maintained contacts with other governmental agencies and submitted memoranda, suggestions, and advice to these agencies in response to their requests. He prepared speeches and articles relating to the Negro and the various programs of the Department of the Interior and the Public Works Administration, and cooperated with the United States Information Service in answering hundreds of requests relative to various phases of the Negro's economic, educational, and social status in this country.



POWER AND NAVIGATION ON THE COLUMBIA RIVER.

Air view of Bonneville project, major factor in preserving natural resources in the Oregon-Washington area.

THE BONNEVILLE PROJECT

F. A. Banks, *Acting Administrator*

COMPLETION of the Bonneville project, first Federal navigation and hydroelectric development on the Columbia River, will make available to residents of the Pacific Northwest an increasing supply of low-cost electric power. The project was created by an act of the Seventy-fifth Congress (approved Aug. 20, 1937), and J. D. Ross was appointed first Administrator. Mr. Ross died March 14, 1939. To replace him, on May 4, 1939, the Secretary of the Interior appointed Frank A. Banks, construction engineer of the Bureau of Reclamation, as Acting Administrator of the Bonneville project. Mr. Banks also retained the position of construction engineer of Grand Coulee Dam and administered both posts simultaneously.

Constructed by the Corps of Engineers as a multiple-purpose project Bonneville Dam is intended to aid in the development of a vast inland empire rich in natural resources. The largest single-lift lock in the world will make the Columbia River accessible to ocean vessels to a point 187 miles inland. The benefits of this development have been felt in reduced freight rates even before completion of the channel. River steamers already are carrying greatly increased tonnages of wool, wheat, and other products from this inland empire.

To help pay the cost of this major navigation development, more than 500,000 kilowatts of hydroelectric power ultimately will be generated at the dam site. The present installation of the dam consists of two units, with a combined capacity of 86,400 kilowatts. Two additional generators now are being manufactured with a total of 104,000 kilowatts, and funds have been appropriated by Congress for two further units of 104,000 kilowatts. Installation of these generators will provide a capacity of 294,204 kilowatts. The present demand for power indicates that the capacity of these generators will be utilized as rapidly as they are installed and the necessary transmission system is completed.

Although the Bonneville power plant has been in the position to generate power since the summer of 1938, only limited distribution has been made. This has been due to the lack of transmission facilities for taking this power away from the plant, there being in existence on July 1, 1938, only one light transmission line owned by the

Northwestern Electric Company. A contract was made with that utility, and by the end of the fiscal year 1939, 35,476,000 kilowatt-hours of power had been sold.

The fiscal year 1939 was the first year during which funds were provided by Congress for construction of a transmission system to market power from Bonneville Dam. During its second session the Seventy-sixth Congress appropriated the sum of \$3,500,000 for the construction of initial lines, and in addition, the Public Works Administration made an allotment on August 18, 1938, of \$10,750,000 for the construction of further transmission lines and substations.

The transmission network under construction at the close of the fiscal year, together with additional lines for which plans have been completed, will make Columbia River power available to most of the population centers of Oregon and Washington. A 220,000-volt line will connect Bonneville with the Federal project at Grand Coulee, to form part of a grid which will encircle the Portland, Seattle, and Wenatchee areas.

Lines of 110,000 volts and less will extend down the fertile Willamette Valley, westward toward the coastal counties, and inland to the rich, irrigated lands of Oregon and Washington. Plans have been prepared for erection of suitable substations to meet growing local demands for Columbia River hydroelectric power.

Major work of the project during the fiscal year was commencement of construction of an initial network of 550 miles of high-voltage lines. Lines scheduled to be completed in November 1939 include a twin-circuit 220,000-volt line from Bonneville Dam to the major substation at Vancouver, from which power will be dispatched to Western Oregon and Washington communities.

Construction of this "backbone" line was 65 percent completed at the close of the fiscal year. For a short distance the line traverses the famous Columbia River gorge, and towers and conductors have been designed to withstand 60-mile-an-hour gales when the cables are swollen with ice to the size of a man's arm. A considerable section of the line is constructed through a heavily timbered mountainous region. Completion of this line, including initial substation facilities, is scheduled for November 1939.

The other major line on which construction was started during the fiscal year is designed to serve Portland, Oregon City, Salem, Eugene, and the well-settled Willamette Valley in which approximately half the population of Oregon is located. Construction of this 128-mile line, which will operate at 110,000 volts, involved the erection of numerous river-crossing towers. Two of these towers, situated on the banks of the Columbia River at Portland and Van-

couver, are each 534 feet high, and are among the highest river-crossing towers in America. This line was 25 percent completed at the close of the fiscal year, and will be finished before the end of the 1939 calendar year.

Plans and specifications were completed during the fiscal year for the longest single line of the program, a 220,000-volt circuit to connect Bonneville with Grand Coulee Dam. Linking these two projects will permit interchange of approximately 100,000 kilowatts of energy over the single circuit. Completion of this line and a connecting line of similar voltage from the Vancouver substation to Kelso is scheduled for June 30, 1940.

Other 110,000-volt lines, for which plans and specifications have been prepared, will extend from the dam eastward through Hood River and Wasco Counties in Oregon, and from Chehalis westward to Raymond on the Pacific coast. Both of these lines will be completed by the end of the 1940 fiscal year.

The line construction approved during the fiscal year involves a total of 550 miles and includes the purchase of 1,736 steel towers, 2,692 wood pole structures, 2,141 miles of conductors, and 274,625 insulators purchased to date.

At the end of the fiscal year, construction was well under way on substations at Vancouver, North Bonneville, Eugene, Portland, and Bonneville. Plans are being prepared for erection of other substations during the next fiscal year.

Construction of the initial Bonneville network presented major engineering and administrative problems. These, however, were solved rapidly. Staff of the project grew from 138 persons at the beginning of the fiscal year to 969 at the close of the period. A large number of skilled workmen also are employed by contractors who are erecting the lines. Clearing of the heavily timbered right-of-way is being done by the Work Projects Administration. At the close of the fiscal year approximately 5,760,000 man-hours of W. P. A. labor had been used.

In addition to the foregoing lines a short low-voltage circuit to Cascade locks was completed at the beginning of the fiscal year. This community, situated 5 miles from the dam site, now is being served with Bonneville power.

Construction of the initial network is being hastened to meet requests for power which have been received by the Administrator from private utility companies, public power districts, municipal electric systems, and rural cooperative associations. None of these systems (except the Northwestern Electric Co., which already is being served, and the agencies adjacent to the dam) can receive Bonneville power

until completion of the necessary circuits. Present lines in the area are either heavily loaded or are inadequate to carry required quantities of power from the dam site. The Bonneville transmission network has been designed to permit full utilization of practically all generation and transmission facilities of existing systems. The Bonneville network is planned to meet the growing power needs of the region and to avoid duplication of lines.

Plans for the next fiscal year include erection of a 220,000-volt line to extend northward from Kelso into the Puget Sound area. It is planned to have this circuit ultimately run eastward through the Cascade Mountains and connect directly with the Grand Coulee project. The line to be constructed next year will reach the most densely populated sections of Washington, and enable the major municipal plants situated there to interconnect with the Federal system. Other lines to be constructed include a 110,000-volt circuit through the rich irrigated counties of Yakima and Kittitas.

Hydroelectric energy from the Columbia River dam will be available along the entire transmission system at a uniform wholesale rate of \$17.50 per kilowatt-year for prime power. This policy is intended to encourage exploitation of local resources throughout the region and to aid in the establishment of decentralized industrial developments. At the dam site the rate for prime power is \$14.50 per kilowatt-year for customers who construct their own lines.

Wholesale power rates, based on the kilowatt-year sales unit, are intended to encourage continuous use of energy. Existing fuel and older hydroelectric plants may be used advantageously by utilities and public systems in conjunction with energy purchased from the Federal dam, and such plants will be especially useful for meeting peak-load requirements. To assist smaller customers such as districts, municipalities, and cooperative associations in building up their loads, the acting administrator has prepared for submission to the Federal Power Commission supplementary schedules for the sale of power on a month-to-month basis. He has also prepared schedules for the sale of "dump" energy.

Oregon and Washington, at the present time, are served by 64 private utility companies, 20 municipal plants, and 8 cooperative associations. Twenty-five county-wide public districts have been formed in Washington and five districts in the State of Oregon. The majority of these agencies are looking to completion of the Bonneville transmission network for hydroelectric power from the Federal projects on the Columbia River. Congress has directed that these public and cooperative purchasers be accorded preference in the sale of energy from Bonneville Dam.

Forms of contracts under which Bonneville power will be sold now are under preparation. Particular attention has been given to the terms of contracts with private agencies and public agencies to insure the resale of energy to the public at rates that are reasonable and nondiscriminatory. It is expected that these forms of contracts will be completed shortly after the end of the fiscal year. Approval by the Federal Power Commission of supplementary wholesale schedules is expected within a short time after submission.

Harnessing of the vast power potentialities of the Columbia River is expected not only to increase use of electricity in the home and on the farm, but also to encourage development of the resources of the region. Low retail rates will stimulate supplementary irrigation and reclamation of large blocks of potentially fertile land. Extensive deposits of mineral ores await the availability of low-cost hydroelectric power for profitable exploitation. In the Pacific Northwest, large farm surpluses and waste timber can be converted into valuable products by electrical and mechanical processes.

Studies made by the Bonneville project disclose the fact that the Northwest suffers from marked deficiencies in most industries—chemical, rubber, textile, iron, transportation, and others.

Development of multiple-purpose projects such as Bonneville and Grand Coulee can assist in solving the major economic problems of the Northwest: depletion of timber resources, greatly increased population caused by migration from the drought regions, and an unbalance of trade resulting from lack of industrial development. Low-cost hydroelectric power, deep water transportation, and reclamation of vast acreages of fertile land will enable many more citizens to enjoy the potential bounty of a region which embraces 13 percent of the area of the nation, but has a population of less than 3 percent. Development of the resources of the Columbia River Basin in accordance with the principles of progressive conservation may provide a new frontier for hundreds of thousands of marginal farmers and artisans who look hopefully westward for the chance to earn a livelihood in the traditional American way.

DIVISION OF INFORMATION

Michael W. Straus, *Director*

ESTABLISHED in 1937 to facilitate reporting to the public the facts on the various research, economic, and conservation programs and policies of the Department of the Interior and its various agencies, the Division of Information, during the year, successfully added radio to the media employed to disseminate information.

The Division also served throughout the year as the informational agency of the Public Works Administration until the transfer of that organization to the Federal Works Administration on July 1, 1939, in accordance with the President's reorganization plan.

Maintaining supervision over the preparation of publications, public announcements, and releases to the press, with the exception of purely scientific and technical papers, over radio programs sponsored or authorized by the Department, and over the production and distribution of official photographs, the Division coordinated the various informational activities of the Department.

Responding to public demand for information, 635 press releases were issued during the year, covering features of operations within the 25 separate agencies of the Department. More than 93,000 booklets on conservation, prepared as a supplement to radio-broadcasting activities, were distributed, and numerous other publications of the Department were provided for public information.

A total of 51 coast-to-coast radio broadcasts, reaching an estimated 153,000,000 listeners during the year, constituted the record of the Radio Section of the Division, which operates the only official Government radio studio for the benefit of the public and the several Federal establishments.

Through the program, "Mr. President," the annual report of the Secretary of the Interior was dramatized in a radio broadcast for the first time in governmental history, while 22 weekly programs in the "What Price America" series carried the message of the Nation's history and the development of conservation into thousands of homes, schools, and colleges.

Altogether, 18 separate governmental agencies were furnished with the facilities of the Radio Section during the year. The broadcast "This, Our America," which served as a medium of information concerning the 1938 edition of the official map of the United States,

compiled by the General Land Office of the Department of the Interior, resulted in greatly increased sales for this publication. Total sales of the 1936 edition of the map amounted to 557 copies. This year, 2,197 copies have been sold, and extra demands resulted in the necessity for securing 4,000 additional prints of the master map of the United States.

These maps are sold through the Superintendent of Documents. Radio networks, nationally distributed publications, and the Division of Information cooperated in presenting the new map with the result that all sales records were broken. Radio networks and stations generally contributed facilities, air time, and production personnel to the presentation of Department of the Interior programs, without expense to the Government in instances when the Division of Information was willing and able to undertake the preparation of feature or dramatized scripts and supervise arrangements. They continue to offer such cooperation. The result has been that radio has proved the most economical method of reporting governmental research and activity to citizens.

The Division of Information prepared or assisted in preparing published reports on the work of the Department and its agencies and responded to a vast volume of inquiry concerning such work. Demands made upon the Division reflected an increasing public interest in conservation policies and requirements accompanied by a public willingness to cooperate in those policies through educational rather than policing programs.

INTERIOR DEPARTMENT MUSEUM

H. L. Raul, *Museum Curator*

THE MUSEUM of the Department of the Interior, a unit of the Office of the Secretary, visualizes and explains the history, organization, and activities of the various bureaus of the Department. The Museum consists of office quarters and 10 exhibit galleries, containing more than a hundred modern, built-in, indirectly lighted display cases. There are approximately 1,000 specimens, 250 charts and maps, 500 special photographs, 100 models, together with 12 large hand-painted wall maps, 14 mural paintings, 11 dioramas, and numerous miscellaneous items; there are over 1,450 explanatory labels, making a total of over 3,300 items.

The Museum renders a unique service by maintaining a constant and direct personal contact with the public. With this fact in mind, a progressive program is carried forward under the following policy: (a) To maintain close cooperation with the Bureaus of the Department; (b) to maintain continual and courteous contact with the public, relating to the many and varied activities of the Department; (c) to extend the influence of the Museum in its services to the Department and to the public.

An average of 3,000 to 4,000 persons visit the Museum monthly. Visitors have registered from every State in the Nation, as well as from Alaska, Hawaii, Puerto Rico, and the Canal Zone. Among Museum visitors represented in the visitors' register were callers from the following countries: Argentine Republic, Bavaria, Bulgaria, Canada, China, England, Finland, France, Germany, Iceland, Iran, Ireland, Italy, Japan, Mexico, the Netherlands, Poland, Scotland, South Africa, South America, Sweden, Switzerland, and Venezuela. During the past 12 months representatives, seeking new ideas in America, have come from museums of foreign countries and have visited the Museum and inquired into its methods. Museum representatives have come from Montreal, London, Liverpool, New Zealand, South Africa, and China, as well as from Boston, New York, Philadelphia, and Los Angeles.

A rotating series of special temporary exhibits has been inaugurated, the first of which was a three months' exhibition, by special invitation of the Secretary, of the collection of honorary gavels presented by numerous States and organizations to the Hon. Edward T.

Taylor, of Colorado, in recognition of Mr. Taylor's outstanding accomplishments in the field of conservation. Other special exhibits include current features relating to the work of the various bureaus.

During the year a large number of special groups, including school and college classes, visited the Museum for conducted tours. School classes which paid organized visits to the Museum came from New York, New Jersey, Pennsylvania, and from such distant points as Ohio and Alabama. Visits from student and organized groups from Maryland, Virginia, and the District of Columbia are of almost daily occurrence. Many calls were received by the Museum for assistance in preparing study courses for schools in such subjects as conservation, reclamation, the national parks, and Indian affairs. A pamphlet was printed by the Museum containing descriptive material. Other pamphlets pertaining to the work of the Department were distributed from the information desk.

The Museum is growing in its influence, in its services, and also in its needs. Natural changes and improvements continually should be expected. No museum should be allowed to become stagnant. A petrified forest is a national asset, a petrified museum is not. It is desirable to maintain the Interior Department Museum in a condition that is strictly up to date, fluent, and alive. The interest manifested by the officers of the Department and the cooperation extended by the Bureaus is gratefully acknowledged.

OFFICE OF DIRECTOR OF FORESTS

Lee Muck, Director

ALTHOUGH approximately 1,000,000,000 acres of the 1,500,000,000 acres that at one time comprised the public domain of the United States have been disposed of, and about 150,000,000 acres reserved for national forests and other purposes have been placed under the administration of other departments, there are still approximately 265,000,000 acres of public lands under the jurisdiction of the Department of the Interior in the continental United States. This is by far the largest public-land area under the jurisdiction of any Federal Department, exceeding by more than 100,000,000 acres that of any other Department. In addition to this vast and far-flung area in the United States proper, the Department of the Interior also has 335,000,000 acres of public lands under its supervision in the Territory of Alaska, thus making the Department responsible for the administrative management of a 600,000,000-acre estate, or approximately three-fourths of all lands now in Federal ownership.

This highly valuable public asset is comprised of a wide range of resources including the primeval forests of the National parks, the productive forests of the revested and reconveyed grant lands of Oregon, the valuable timber stands on Indian reservations, the forests and woodlands of the unappropriated and unreserved public lands, vast areas of productive grazing lands, extensive water and mineral resources, valuable coal and oil deposits, and unique scenic areas. As a consequence of the diversification in the character, extent and distribution of these resources, management policies are naturally also diversified and must be harmonized and made sufficiently broad and flexible to permit of the use of a wide variety of acceptable practices ranging from the preservation of areas in a primeval state for esthetic and recreational purposes to the intensive development and management of areas for industrial advancement and the sustaining of dependent communities.

The forest resources under the jurisdiction of the Department of the Interior in the United States and Alaska are as follows:

Agency	Forest area, United States	Forest area, Alaska	Total forest area
Biological Survey.....	750,000	.....	750,000
Grazing Service.....	¹ 25,000,000	.....	25,000,000
General Land Office.....	² 3,000,000	³ 150,000,000	153,000,000
Oregon and California Lands.....	2,680,000	.....	2,680,000
National Park Service.....	⁴ 8,000,000	100,000	8,100,000
Office of Indian Affairs.....	⁴ 16,000,000	.....	16,000,000
Bureau of Reclamation.....	10,000	.....	10,000
Total.....	55,440,000	150,100,000	205,540,000

¹ A rough estimate.

² Located principally in Oregon, Washington, and Idaho.

³ Includes 40,000,000 acres of comparatively dense spruce and 110,000,000 acres of open woodland.

⁴ Includes juniper-piñon type.

The forest lands under the jurisdiction of the Department of the Interior, excepting those included in the public domain proper, were set aside for specific purposes, the major objective to be realized being set forth in congressional enactments. These objectives vary from the preservation of the forests in their natural condition in the case of the national parks, to logging them with due care for their replacement in the case of Indian forests and Oregon and California forests. Specific legal restrictions thus apply to the national parks, but on other lands full use of all resources is permitted under sound conservation principles and practices. The Department thus finds itself the custodian of a vast domain divided into several categories of permitted use, each category being administered by and under the jurisdiction of a separate office or bureau.

FORESTRY PROBLEMS HANDLED

Inasmuch as several administrative units of the Department are concerned with the use and management of forest resources and since different laws apply to the lands under the jurisdiction of each, the Secretary of the Interior, by Departmental Order No. 1283, dated May 18, 1938, created the Office of Director of Forests for the purpose of bringing about the fullest possible measure of coordination and integration of forestry functions and activities within the Department.

The major problems with which the Office of Director of Forests was concerned during the fiscal year 1939 were:

1. The organization of the Oregon and California Revested and Reconveyed Grant Lands Administration.
2. The conducting of a survey and the compilation of a report covering the forest resources and the administrative organization for forestry under the jurisdiction of the Department of the Interior, for presentation to the Joint Congressional Committee on Forestry.

3. The administrative direction of Indian forest and range lands.
4. The direction and control of Departmental forestry business.
5. The rendering of technical advisory service to the Department and its several bureaus dealing with forestry matters.

OREGON AND CALIFORNIA REVESTED LANDS

Among the new and larger forestry responsibilities of the Department is the administration of the Oregon and California revested and reconveyed grant lands, comprising an area of 2,680,000 acres, located in 18 counties in western Oregon. According to the Federal Forest Survey, the total timber volume on these lands is approximately 46 billion board feet, thus placing them in the front rank of American forests. The act of August 28, 1937, provided for a plan of sustained-yield forest management covering this far-flung forest property and limited the cost of administration to 25 percent of the gross income. This special fiscal provision requires planning within income, and places the entire set-up on a sound business basis.

Major forward steps were taken during the fiscal year in the organization of the Oregon and California forest administration; regulations providing for the sale of the timber under forestry principles were placed in effect; an administrative and supervisory personnel was appointed and organized; a classification of the lands required by the 1937 act was started; tentative sustained-yield units were outlined; a large number of forest improvements were constructed; a comparatively substantial volume of timber was advertised and sold; and, finally, the entire business set-up was brought under direct administrative control. Much remains to be accomplished in connection with the development and improvement of this important forest enterprise. However, a consideration of the progress made during the fiscal year ended June 30, 1939, leaves little doubt of the continued success of the undertaking under the sound forestry principles provided by the authorizing legislation.

OTHER WORK ACCOMPLISHED

For the first time in the history of the Department a specific authorization was given and funds were provided for the protection of the interior forests of Alaska. An amount of \$37,500 was made available for the fiscal year beginning July 1, 1939. The fact is recognized that a much larger appropriation is necessary to adequately protect the vast forest and range resources of this territory. However, a foundation looking to effective protection and administration has been laid down and a small but efficient organization is now functioning in the field under the direction of an experienced forester. Much progress

is being made through the cooperation of the Civilian Conservation Corps and other Federal and private organizations operating in Alaska, and a reasonable degree of success is assured although the funds available for direct administration are comparatively limited.

The Division of Forestry and Grazing of the Indian Service and the Branch of Forestry of the National Park Service functioned effectively during 1939 and closed the year with comparatively good fire records. Neither of these organizations receive adequate funds for the protection and administration of the valuable resources under their supervision and have found it necessary to depend in large measure upon the assistance rendered by the Civilian Conservation Corps. A high degree of cooperation in the field has been developed between these two forestry organizations and the Oregon and California Administration. These cooperative efforts have already demonstrated their mutual advantages especially in the control of forest fires.

The Forestry and Grazing Division of the Indian Service maintained its established record of operating well within income for the fiscal period 1939. The forests and lumber manufacturing plants under its supervision returned substantial values to the Indians and the cost of operations approximated 15 percent of the gross income. The facts concerning the management of Indian forests are contained in the section of the annual report devoted to the Office of Indian Affairs.

The Office of Director of Forests was given congressional approval in the Appropriation Act of the Department of the Interior for the fiscal year beginning July 1, 1939, and three positions were authorized. Consequently it is planned to increase the staff by employing an additional trained forester and to enlarge the scope of its functions and activities. A comparatively large volume of work was accomplished during the year. Several field investigations were conducted, and much correspondence and legislation were reviewed and acted upon. A number of court cases covering forestry matters were completed. The forestry functions and activities of the whole Department both in the field and the Washington Office were more fully coordinated and integrated and all administrative units of the Department dealing with forestry were drawn more closely together in the interest of efficiency and economy.

ST. ELIZABETHS HOSPITAL

Winfred Overholser, M. D., *Superintendent*

I HAVE the honor to submit herewith the annual report of St. Elizabeths Hospital for the fiscal year ending June 30, 1939. The year has been on the whole a successful one. Every effort has been exerted to maintain the care of the patients, the prime duty and interest of the hospital, on a level worthy of the fine traditions of the hospital, thanks to the interest and intelligent cooperation of the medical staff and ward personnel. The growth of the hospital has continued, and shows no sign of immediate decrease. The general health of the patients has been maintained, and no epidemics or strikingly unusual occurrences have taken place. The physical plant has been efficiently maintained, and the teaching and research programs have been vigorously prosecuted.

MOVEMENT OF POPULATION

On June 30, 1930, 6,274 patients remained in the hospital, as compared with 5,968 on June 30, 1938, an increase of 306.

The total number of patients under treatment during the year was 7,024, as compared with 6,696 the preceding year, an increase of 328.

The total number of admissions during the year was 1,056, as compared with 1,029 the preceding year, an increase of 27.

The total number of discharges for the year was 469, as compared with 461 in the preceding year, an increase of 8.

The total number of deaths for the year was 281, as compared with 267 for the preceding year, an increase of 14.

The total number of discharges and deaths, combined, was 750, compared with 728 for the preceding year, an increase of 22.

There were 66 burials in the hospital cemetery, as compared with 64 the preceding year, an increase of 2. All honorably discharged service men are entitled to burial in the Arlington National Cemetery. All bodies not buried at the hospital or Arlington Cemetery were taken by registered undertakers for burial in other cemeteries.

The daily average patient population was 6,108, as compared with 5,835.7 the preceding year, an increase of 272.3. Seven hundred and seventy-seven District patients were admitted, as against 741 for the previous year. It is probable that the proposed modification to



ONE OF THE NATION'S FOREMOST INSTITUTIONS FOR CARE OF THE MENTALLY ILL, ST. ELIZABETHS HOSPITAL, IN WASHINGTON,
AS SEEN FROM THE AIR.

the act created as the "Commission on Mental Health" will result in considerable increase in District patient admissions for 1940, but probably due to the fact that these patients will be admitted during the early part of their disease the number of hospital days per patient should be somewhat decreased.

An interesting feature of the admissions is that although a net increase in admissions of 27 is noted over the preceding year, there were actually 32 more colored males and 41 colored females admitted than in 1938, or an increase of 73; in other words, a decrease of 46 white admissions took place. No explanation is offered at this time, but the trend will be carefully observed during the coming years.

Movement of Patient Population, Fiscal Year 1939

	Male			Female			Total
	White	Colored	Total	White	Colored	Total	
Remaining on rolls June 30, 1938.....	2,959	940	3,899	1,315	754	2,069	5,968
Admitted during year ended June 30, 1939.....	457	201	658	243	155	398	1,056
Total number under care and treatment during year ended June 30, 1939.....	3,416	1,141	4,557	1,558	909	2,467	7,024
Discharged as—							
Not insane.....	10	3	13	0	0	0	13
Recovered.....	96	22	118	49	17	66	184
Improved.....	84	27	111	23	11	34	145
Unimproved.....	77	15	92	26	9	35	127
Total discharged.....	267	67	334	98	37	135	469
Died.....	106	52	158	71	52	123	281
Total of patients discharged and died.....	373	119	492	169	89	258	750
Number of patients remaining on rolls June 30, 1939.....	3,043	1,022	4,065	1,389	820	2,209	6,274

MEDICAL DEPARTMENT

Medical services.—The number of admissions during the fiscal year 1939 totaled 1,056, or approximately 40 percent more than 10 years ago; the increase in admission rate has been fairly consistent throughout the 10-year period. At the same time the total number of discharges has increased with equal consistency, reaching 469, or 44.41 percent of the admissions during the past fiscal year. There has been an increase of 48.4 percent in the number of discharges since a decade ago, as compared with an increase of approximately 40 percent in admissions over a similar period of time. The discharge rate during the past fiscal year has been 1 for every 13 patients under care. The death rate has decreased in recent years, there being 281 deaths during the past fiscal year. The death rate during the past fiscal

year has been 1 per 22 patients under care. Out of 281 deaths during the year autopsies were held on 211, or 75 percent.

At the end of the fiscal year there were 336 patients on visit. Extended visits have been granted to approximately 263 patients during the past fiscal year.

It is believed that a psychiatric follow-up clinic should be organized for patients who have been released from St. Elizabeths Hospital. Also, a neurosyphilis outpatient department might be worthy of consideration, because these patients who have had fever therapy and chemotherapy at the hospital can obtain more satisfactory follow-up treatment by continuing under the supervision of the staff members who are familiar with their cases. A psychiatric outpatient department for the purpose of following patients who have been released from the hospital would not only render a service to the hospital patients but perhaps result in a saving to the District. Possibly a more liberal policy with regard to the release of patients would be feasible if provision should be made for their nominal psychiatric supervision in the community.

On account of the increased number of patients during the year it was necessary to make several changes. Sycamore and Oak Wards have been transferred from the West Side Service to the West Lodge Service to take care of the increased number of colored male patients.

Ward No. 3 in the Women's Receiving Building has been set aside for giving insulin and metrazol therapy, which was carried on from September 12, 1938, to May 31, 1939. Seventy-two patients were given insulin therapy, and 101 patients were given metrazol therapy. One patient received triazol therapy. Twenty-four patients were given combined insulin and metrazol therapy, and 15 patients received insulin therapy followed by a course of metrazol; in all, a total group of 39 received a combination of both insulin and metrazol therapy during the year.

Moving pictures were taken of the metrazol therapy, particularly the cases of depression that were treated, these being taken in color.

Special blood chemical work was done on 37 of the patients treated.

In all there were given 3,955 insulin injections, a total of 362,850 units of insulin used; 1,509 metrazol injections were given, and a total of 1,415 gm. of metrazol were used.

There were comparatively few complications noted during the course of the shock therapy. The combined insulin-metrazol therapy appears more effective in the treatment of schizophrenia than the treatment with either metrazol or insulin alone. We regret to note that after 2 years, during which 225 patients have been treated by

these methods under nearly ideal conditions, 171, or 76 percent, of them still remain in the hospital.

Female Cottage No. 2, formerly used for tuberculous patients, is now used for housing colored female patients; 22 additional beds were provided for this purpose. Female Cottage No. 1 has been repaired and painted, and is to be used for the same purpose.

The new equipment purchased for a beauty parlor in Q Service has been installed, and this parlor has been opened in the basement of the building with a full-time beauty operator. It is functioning in a very satisfactory manner, and the patients seem to appreciate this additional therapeutic procedure.

The colored women's service, known as the Q Service, continues to be extremely overcrowded on account of the increase in admission of colored female patients.

The large number of days off makes a material shortage in personnel, as in this institution there is required service 24 hours each day and 365 days a year. It has been found that with the time off noted two extra employees are required for every three employees on duty. Thus, although the personnel appears generous in number, it is actually not fully adequate for that degree of personal attention to patients which is required by modern standards.

The hydrotherapy treatments in all departments have been very materially increased; it will be necessary to give consideration at an early date to installing a hydrotherapy department in Howard Hall Building, West Lodge Service, and West Side Service.

The beauty parlors in the Women's Receiving Service and in the Toner Building continue to be extremely popular with the patients and apparently have a decidedly beneficial effect on many of them.

In the white women's service there has been a definite increase in the percentage of cases of dementia precox admitted to the hospital during the year, 36.8 percent as compared to 30.2 percent last year. At the same time there has been a decrease in the percentage of cases of psychosis with cerebral arteriosclerosis admitted, namely from 23.7 percent last year to 19.7 percent this year. There appears to be an increase in the percentage of functional mental illness admitted to the hospital; 55.2 percent this year as compared to 46.1 percent last year. There is a corresponding decrease in the cases of organic mental disease; 35.6 percent this year as compared to 44.4 percent last year. Epilepsy and mental deficiency were placed in an unclassified group together with the undiagnosed psychoses. These constituted 9.2 percent.

Among the research activities on the Women's Receiving Service was a study of hyperostosis frontalis interna, which has been completed: involutional psychosis and amniotin therapy, which has been

completed; a project on the study of the relationship between hearing defects and paranoid tendencies, which has been completed; a project is being instituted to study the effect of a special new drug—a belladonna derivative—on Parkinsonian syndrome; and another project of a clinico-pathologic nature has been begun to obtain further knowledge regarding the differentiation between senile and arteriosclerotic psychoses.

During the year an office was opened in the Men's Receiving Building with a podiatrist in charge for treatment of the feet of the various patients.

The heliotherapy deck in the Men's Receiving Building has been remodeled and the entire roof covered with wire mesh, which will not keep out the light and will give protection and freedom to a greater number of patients.

During the year the ward exit, glass-paneled doors in the Men's Receiving Building were replaced by solid wood doors; this became necessary because patients were breaking these panels and making successful elopements.

Arrangements have been made for additional occupational therapy in the Men's Receiving Building. In addition to the occupational department in the basement, a course in printing is given to the patients.

Every effort has been made to reduce the number of seclusions and restraints, and it appears during the past year that these have been reduced to a negligible point.

Medical and surgical service.—The medical service during the past year has been occupied chiefly with the routine medical care of patients and employees in the hospital.

The modern, nonsurgical treatment of tuberculosis, as reported last year, has continued.

The various types of treatment of paresis consisted of the use of both the quartan and tertian malarial therapy, foreign protein therapy to produce fever, reinforced with chemotherapy of various types.

There was no very pronounced epidemic of an infectious disease of the respiratory system during the past winter.

The treatment of the pneumonias was begun during the first part of the winter with the use of the new drug sulfanilamid. During the last part of the winter a supply of the newer drug sulphapyridin was obtained, and such cases thereafter were treated with this drug. The number of cases in which it was used was too small to permit us to draw any conclusions, but it can be said that in each instance the therapy was promptly and entirely successful. The experience, however brief, was sufficiently encouraging to lead us to decide that

during the coming winter the sulphydryl treatment should be the treatment of choice in all cases of pneumonia on their first admission.

Aside from the usual run of surgical procedures during the year the use of the Smith-Peterson nail has been availed of for internal fixation of fracture of the neck of the femur on many occasions.

A new combination ether-aspiration machine, of the fireproof type, was purchased for use in the operating room during the year.

A professional anesthetist has been added to the list of part-time physicians.

The work of the antiluetic clinic continues to increase, the past year showing the largest number of patient-visits during any one year in its history, the number running approximately 11,000.

The experimental investigation of the value of aldarson, reported last year, continued during a part of the current year. In the period elapsed since initiating this type of therapy no definite clinical improvement and only very slight serological improvement has been observed in this group.

The serological survey which was mentioned in the report of last year, has been under way but is not completed.

The number of patient-visits to the Ophthalmological Clinic has increased by approximately 25 percent over the number of visits of the previous year.

The work of the Otolaryngological Clinic has increased about 10 or 12 percent over the preceding year.

The work of the Dermatological Clinic has slightly increased over that of the preceding year.

The work of the Genitourinary Clinic has not increased during the year, the number of patient-visits being approximately the same as during the preceding year.

The number of visits to the Gynecological Clinic has increased about 1 percent during the year over the previous year.

The work in the Physiotherapy Clinic has increased over the preceding year by about 8½ percent in the number of clinic visits, the number of the latter during the current year having been well over 11,000.

The high-frequency short-wave apparatus purchased at the end of the preceding fiscal year has been in use a great deal during the current year and has given eminent satisfaction.

The number of radiographs in the radiographic department of the X-ray division has increased 11 percent over the preceding year, and the number of treatments in the radiotherapy section has increased by 20 percent over the previous year.

During the year a special apparatus has been purchased and installed for encephalographic work. Such work has been under way since about the first of last September and a large number of encephalographic studies have been made.

The number of visits to the Dental Clinic has increased by only a relatively few visits during the course of the year.

The visits to the Minor Surgical Service have increased by 17 percent during the past year over the preceding one.

The Clinical Laboratory established in the Medical and Surgical Service has continued to operate with very great satisfaction.

In Glenside Building, set aside for women tuberculous patients, there have been added seclusion rooms with the result that conditions which necessitated these rooms have been very much improved.

As mentioned earlier, a podiatric service has been set up in the Men's Receiving Building. From September 1938 to June 30, 1939, about 800 cases have been treated. The podiatrist in charge has examined and directed the care of 650 patients who needed treatment for postural and acquired deformities of the feet.

The basement of Continuous Treatment Building No. 3 has been opened as a recreation center for the patients in the Continuous Treatment group. The American Red Cross has arranged to detail one of their workers to this section, and this gives an outlet for patients who otherwise would have no opportunities to participate in recreation affairs.

Laboratory.—The Director of Laboratories, who assumed his duties on July 15, 1938, put into effect a reorganization program which brought about more efficiency and was thus worth the cost, chiefly in manual labor, which it required.

The laboratory has been in the last few years handicapped by vacancies in the technical personnel. We have been fortunate in filling the positions of junior technician and junior chemist, and there has been created a position of physician to take care of the electroencephalography division.

A great deal of additional equipment has been furnished to the laboratory which relieves the handicap existing due to this condition.

Biochemical division.—In addition to the usual work of chemical analysis of the blood, cerebrospinal fluid, and other body fluids for the clinical needs, this division has been active in extensive studies of blood of patients under insulin and metrazol treatments. Moreover, a great deal of work has been done in putting into practice methods of analyses more specifically for research work—analyses of lipids, gases, potassium, sodium, and other minerals.

Electroencephalography division.—The work in this division has already proven its practical usefulness in patients with certain organic diseases in which there is a need for localizing the lesions and also in those cases in which one suspects organic involvement. Electroencephalography is, however, still in the experimental phase, particularly with respect to its significance in psychopathology. Thanks to the fund donated by the Supreme Council, Thirty-third Degree Scottish Rite Masons of the Northern Jurisdiction, United States of America, we were enabled to obtain a three-channel apparatus which will facilitate the work in this division.

The brain-wave studies carried out during the fiscal year are as follows:

Helium and increased pressure experiment-----	68
Schizophrenia with and without sodium amytal-----	65
Miscellaneous: Brain tumor, epilepsy, traumatic, normals-----	20

Research activities in the various departments of the hospital.—Research projects now in progress include:

1. Clinical and histopathological studies of cases of cerebral arteriosclerosis.
2. Study of post-encephalitic psychosis.
3. Study of the conditioned reflex in normals and patients.
4. Study of cases with pituitary tumor.
5. Studies on the distribution of sulfanilamide between blood, cerebrospinal fluid, and urine in organic and functional psychoses.
6. Electroencephalographic studies in schizophrenic patients before and after injection of sodium amytal.
7. Experimental studies in animals on the effect of insulin on the histology of the cerebrospinal nervous system.
8. Experimental studies in animals on the effect of metrazol on the histology of the cerebrospinal nervous system.
9. Biochemical studies with special reference to lipids. A great amount of work was carried out to establish the method.

Department of psychology.—While in the great majority of the cases examined the test given has been the Stanford Binet, old form, some experimental use has been made of other tests with a view to finding the best all-around instrument for the measurement of the intelligence of adult psychotics and the best techniques for determining such questions as organic damage or responsiveness to shock therapy, and for studying the personality structure. Among the tests tried out have been the new form of the Stanford Binet, as a scale for general use, various sorting tests—the Weigl, B. R. L., and Vigotsky—and the Rorschach as predictive of results in shock therapy, and the Rorschach also and the Murray thematic apperception test for special personality studies. Again, as for several years

past, the department has employed the Bernreuter personality inventory together with the Binet test in the examination of all students admitted to the training school.

In research in this department the completed series is as follows:

- I. Dementia precox and general intelligence.
- II. Patterns of mental function in dementia precox.
- III. Dementia precox and the concept of deterioration.

Besides this completed work a number of shorter studies are under way which it is hoped may be finished during the coming year.

1. A comparison of the performance of a group of patients on the Binet test before and after pharmacological shock therapy.
2. A comparison of the performance of a group of patients on the new and the old forms of the Binet test.
3. A study of the value of the new sorting tests—the Weigl, B. R. L., and Vigotsky—in predicting the results of pharmacological shock therapy in different types of psychosis.
4. A study of the value of the Rorschach test in predicting the results of pharmacological shock therapy in different types of psychosis.
5. A study of the performance of groups of patients suffering from various types of organic brain disease on the new sorting tests—Weigl, B. R. L., and Vigotsky—and on the Kohs block test.

Nurses' Training School.—A committee of the Nurses' Training School was appointed during the year with Dr. Reichenbach as chairman, Dr. Eldridge, Dr. Hall, and Dr. Silk. Under their direction the School of Nurses for training student nurses opened on October 15, 1939, with a class of 38 students—9 men and 29 women.

During the past year postgraduate courses for nurses have been much more satisfactorily carried on and this course reorganized.

The affiliating schools have been carefully selected; the type of affiliates obtained and quality of work have improved.

Students Enrolled in the Nurses' Training School

JULY 1, 1938		JUNE 30, 1939	
St. Elizabeths students.....	18	St. Elizabeths students.....	28
Third year.....	18	Third year.....	0
Second year.....	0	Second year.....	0
First year.....	0	First year.....	28
Affiliated students in psychiatry..	42	Affiliate students.....	33
Affiliate students in medicine.....	1	Freedmen's Hospital affiliate stu-	
Postgraduates enrolled July 1, 1938	5	dents.....	8
(2 other postgraduates re-		Postgraduates enrolled July 1, 1939	9
ported July 5, 1938.)			
	—	Total enrolled.....	78
Total enrolled.....	66		

St. Elizabeths students:

Total in school July 1, 1938-----	18
Graduated during the year-----	18
<hr/>	
Enrolled in school Nov. 16, 1938-----	36
Resigned during the year-----	8
<hr/>	
Total in school June 30, 1939-----	28

Of the 18 students who were enrolled in the third-year class as of July 1, 1938, and have all completed their course of training, 11 have been appointed to the hospital as graduate nurses (8 of these nurses are now on the staff, 3 having resigned).

An agreement was arranged by the School of Nursing of St. Elizabeths Hospital and Freedmen's Hospital School of Nursing whereby the Freedmen's students reported to the hospital daily for classes and experience in psychiatric nursing. The first group of students reported as of December 1, 1938.

Libraries.—The medical library (including the nurses' library and the deposit libraries in the Medical and Surgical Building and in the laboratory) received the addition of 71 new books purchased, and 21 books received as gifts. Five hundred and twenty-seven books in the nurses' collection were transferred to the medical library. This makes a total of 10,121 volumes and a large number of miscellaneous pamphlets, reports, and bulletins of our own hospital in the library. The library subscribes to 54 periodicals, including the *Index Medicus*.

The library was very fortunate in receiving through Mrs. William A. White the gift of Dr. White's private collection of over 1,500 books and a number of reprints. The books were formally presented January 31, 1939, and while in the possession of the hospital have not yet been transferred to the medical library.

A total of 1,003 volumes were added to the patients' library during the year. Of these, 168 were new books purchased by the hospital, 554 were donated, and the balance were magazines obtained from the bindery. Total number of books on hand, 17,533. Thirty-three popular magazines and 5 newspapers, daily and Sunday, were regularly received. Approximately 300 books are drawn daily, two-thirds of them being fiction, and about 3,500 books were in constant circulation.

RECREATIONAL, VOCATIONAL, AND OCCUPATIONAL WORK

Occupational therapy.—During the year 1,053 patients working in the occupational therapy turned in 13,607 pieces of craft work and 48,742 pieces of industrial work.

The printing department turned out 120,720 copies of various items.

Social service.—During the year the total number of patients looked after by the social service was 366. They obtained 82 histories; service was rendered for 233 in-patients, and they made 354 visits to make surveys.

Red Cross.—The local representatives of the American Red Cross under the field director have continued their program of former years, in cooperating with the hospital and increasing the amount of work. Certain special projects have been undertaken during the year which have been a source of much pleasure to the patients.

There are now nine persons on duty daily at the hospital who are paid by the American National Red Cross. The Red Cross House has been kept open daily from 10 a. m. to 8 p. m. The daily house population of individual patients and of patients in groups is between 300 and 400. During the year the Red Cross workers chose the moving pictures and paid for the operation of 94 films furnished to the hospital. They initiated and conducted 273 parties and entertainments, 16 band concerts, and distributed 2,778 tickets to theater and baseball parties. During the past year the patients had three boat rides down the river; these boat rides were given through the American Legion, and transportation was supplied partially by the Legion, by the District Chapter Motor Corps, and by the hospital. The American Red Cross furnished transportation for the patients to the White House lawn party. During the year there were 509 ward activities, parties, music, dances, etc., and the Red Cross distributed 1,050,000 cigarettes.

The W. P. A. Trio and the W. P. A. Dance Orchestra played several times a week and permitted us to have a tea dance and bridge party every Thursday during the year for both men and women patients. The W. P. A. has now secured a music teacher for the colored patients.

There were special parties for the Indians.

On January 31, 1939, the Honorable the Secretary of the Interior unveiled a large photograph of the late Superintendent, Dr. William A. White, in the lobby of the Men's Receiving Building, in the midst of a large gathering of employees in the hospital and friends of the former Superintendent and Mrs. White. This painting, executed by Mr. Henry R. Rittenberg, was paid for by voluntary gifts from the employees and friends of Dr. White.

ADMINISTRATIVE DEPARTMENT—OFFICE OF THE ASSISTANT TO THE SUPERINTENDENT

Supplies.—The supplies produced on the hospital reservation, including farm and garden products, included the following: 281,092

gallons of milk, 173,642 pounds of fresh pork, 4,051 pounds of chicken, 481 bushels of beans, 16,583 bunches of beets, 1,071 bushels of cabbage, 51,057 bunches of carrots, 656 bushels of collards, 42,400 ears of green corn, 113 bushels of cucumbers, 6,650 bunches of endives, 1,826 bushels of kale, 39,600 heads of lettuce, 10,579 bushels of dry onions, 62,400 bunches of green onions, 11,142 bunches of parsley, 237 bushels of parsnips, 697 bushels of green peppers, 641 bushels of sweetpotatoes, 3,174 pumpkins, 17,217 bunches of radishes, 672 bushels of spinach, 406 bushels of mustard spinach, 761 bushels of squash and 483 single squash, 3,317 bushels of Swiss chard, 2,561 bushels of ripe tomatoes and 53 bushels of green tomatoes, 1,607 bushels of turnips, and 644 bushels of turnip greens.

In addition to the items mentioned, 26,448 gallons of ice cream were manufactured by the hospital. The farm produced forage as follows: 31 tons of alfalfa hay; 37 tons of blue grass and timothy, mixed; 510 tons of corn ensilage; 75 tons of soybean hay; 24 tons of soybean and sudan grass hay; 25 tons of timothy hay; 58 tons of wheat hay; and 3,000 bushels of ear corn.

The shoe shop produced 6,966 pairs of shoes and slippers for men, 1,617 pairs of shoes and slippers for women, and 27 pairs for boys. It repaired 1,991 pairs of shoes and slippers. It produced 2,664 belts and 3,851 suspenders, all made in the same department.

The mattress shop produced 2,688 mattresses and 2,415 pillows. The brush shop turned out 1,888 of various kinds of brushes. The broom shop made 4,201 common brooms and 156 whisk brooms. In the bakery there were baked 917,161 loaves of bread, 3,403,608 rolls, and 64,092 pounds of pastry. The laundry washed, dried, and ironed 14,435,569 pieces. The power plant manufactured 532,952,000 pounds of steam; the electrical department generated 3,916,140 kilowatt-hours of electricity; there were pumped 433,433,000 gallons of water, and the main refrigeration plant produced 7,491 tons of ice and refrigeration. All the steam, electricity, ice, and refrigeration used on the reservation was manufactured by the hospital.

In addition, large quantities of clothing for men and women were made in the sewing rooms, tailor shops, and occupational therapy departments, including 3,808 aprons of various classes, 2,435 pairs of bloomers, 850 covers, 2,416 curtains, 2,700 pairs of drawers, 32,000 dresses of various classes, 22,690 sheets, 2,150 shirts, 12,228 slips, 6,882 pairs of step-ins, 1,445 tablecloths, 2,560 mattress ticks, 1,637 pillow ticks, 20,800 towels, 3,000 berets, 637 woven rugs, 633 embroidered runners, 3,646 linen towels, and other items.

Dairy and cow barn.—The Holstein-Friesian herd was again tested for tuberculosis in March 1939 and found to be practically free from this disease. The herd, consisting of 437 cows, heifers, calves, and bulls, is one of the largest accredited herds in the country. The last test for Bang's disease was made April 10, 1939, and the herd is free of this disease.

The output of milk has slightly decreased during the year, but additional cows have been purchased in order to keep up the average. Lack of space prevents the caring for the number of cows to furnish all the milk required, and about 200 gallons per day additional milk were purchased to meet requirements. The lowest daily production of the herd during the year was August 1939, 596 gallons; the highest daily production was March 1939, 894 gallons. With the increased population, the hospital will require a daily production of over 1,000 gallons of milk. Compared to the maximum production of 894 gallons and the minimum of 596 gallons, we will probably require a herd of between 325 and 350 milking cows to produce the estimated quantity of milk required. This would require at all times over 600 cows, heifers, etc., on hand.

Hogs.—The herd of hogs is in excellent condition. No contagious or infectious disease existed during the year. The hogs numbered 797, which produced 173,642 pounds of fresh pork during the year.

Poultry plant.—There was an outbreak of disease in the poultry during the previous year which resulted in the killing off of all fowl. The land was plowed over to rid the premises of parasites and diseases. New chicks were purchased, numbering 2,000 baby white leghorns and 500 New Hampshire reds, and at the beginning of the season, in March, an additional 2,000 white leghorns and 700 New Hampshire reds. The records show that broilers were available in December 1938 and the new pullets began laying in February. During the balance of the fiscal year these new arrivals furnished the hospital with 4,051 pounds of chicken and 4,962 dozen eggs.

Of particular importance has been the introduction of a number of crops, the purpose being to ensure a more steady flow of vegetables to the hospital, vary the patients' diet, improve the land, etc. Some failed to answer the purpose; others were highly successful. Among the latter may be mentioned Swiss chard, first tried in 1930, which has proven to be one of the most reliable, as well as the best producer per acre among the crops grown for table greens in the past eight years.

Another crop worthy of mention is soybean, introduced into the cropping system as a hay crop.

This intensive use of land was a natural result of the ever-increasing pressure for more foodstuffs for the growing population of the hospital. The need of additional farm land is vital. The location of the dairy and piggery in the center of a large growing city population is meeting with objection, while a small production is not in keeping with the needs of the hospital.

Lawns and grounds.—The increased number of buildings with lawns around them has materially increased the work of this department. Lawns have been arranged in connection with all new buildings, and flowerpots have been set out in all portions of the grounds.

Personnel.—The total number of employees on the hospital rolls June 30, 1939, was 1,786. There were 441 appointments during the year, and 381 separations.

During the year 19 of the old employees were retired from the service on account of age and disability.

Administrative promotions (salary rating increases) were granted to 59 employees. Promotions in grade and position were granted to 43 employees.

There was a 13½ percent turn-over in the permanent personnel, occurring chiefly in the force of attendants. This was an increase of about 1½ percent over the previous year.

Those retired were the following:

Lucy Gaddis.....	Assistant cook.
Milton F. Colburn.....	Carpenter.
George Hooper.....	Assistant foreman of laborers.
Mary E. Barnard.....	Seamstress.
Harry L. Kelly.....	Foreman plumber.
Bessie M. Sawyer.....	Waitress.
Mary E. Bush.....	Kitchen helper.
Katie Martin.....	Do.
Hilda Moore.....	Do.
Richard E. Craig.....	Cook.
Matilda A. Butler.....	Assistant cook.
Frank Stewart.....	Junior laborer.
Edith Jones.....	Laundress.
Margaret C. Burch.....	Do.
Daniel Boswell.....	Attendant.
Harvey E. Miller.....	Do.
Wilmer A. Higgs.....	Do.
Rosie King.....	Assistant supervisor.
Albert Corum.....	Chauffeur.

Among the appointments was Dr. Riley H. Guthrie, first assistant physician, who took office on January 16, 1939.

Purchases.—Supplies were ordered in the amount of \$1,709,833. Of this amount, \$789,679 were open-market purchases. There were 300

formal contracts entered into, including one for Continuous Treatment Buildings Nos. 5 and 6, amounting to \$609,000.

Financial office.—During the year disbursements approved through the financial office amounted to \$4,045,885.31 on a total of 4,653 vouchers. Collections received and deposited totaled \$3,034,826.66.

Chief Clerk's office.—During the year 1939 in the stenographic office 20,109 letters were written, 3,495 handwritten notes typed, 16,776 Dictaphone cylinders transcribed, and 952 histories pertaining to patients, totaling 10,394 pages, were written.

Post office.—The post-office work has continued to increase, largely on account of the growth of the patient population.

Fire department.—Regular inspections were made of the whole hospital by the fire marshal for the purpose of protecting it from fire. The fire siren is tested monthly, and also the fire-alarm system. The fire pumps at the powerhouse were tested weekly, and the triple combination pumper was tested daily and put in service once a week. Inspections are made weekly with officers and privates of the District of Columbia Fire Department, and occasionally with inspectors from the fire marshal's office. Fire drills are held weekly in various wards of the institution.

During the year there have been 21 alarms, the property damage amounting to \$15.50. Approximate loss from fires from June 19, 1917, to June 30, 1939, was \$5,874.05, an average of \$267 a year.

Continuous Treatment Building No. 3.—Work was completed on this building on August 8, 1938, and it was turned over to the hospital for occupancy. About 186 patients have been moved into this building.

Continuous Treatment Building No. 4.—Ground was broken July 11, 1938, for Continuous Treatment Building No. 4. The contract provided for completion within 350 calendar days, and with extensions it will be completed and turned over to the hospital at the beginning of the new fiscal year. This will make available for the hospital 186 additional beds.

Continuous Treatment Buildings Nos. 5 and 6.—Specifications were prepared and a contract awarded for Continuous Treatment Buildings Nos. 5 and 6 and a dining-room addition to the kitchen building with connecting corridors. The work was started April 26, 1939, and on June 30, 1939, was 1.68 percent completed, slightly behind schedule. This was due in a measure to labor difficulties in the Washington, D. C., area.

Construction department.—The underpass under Nichols Avenue, together with paving for pedestrian underpass and steps and walk to the employees' cafeteria, was completed.

Also completed was the restoration of the porte cochère at the front entrance to the old Center Building.

The wooden stairway in the Center Building, which has long been considered a fire risk, has been replaced with terrazzo steps, a fire-proof enclosed stairway with metal door frames and calaminated doors on all floor landings.

The abandoned kitchen in the basement of Q Building was remodeled and converted into a beauty parlor. A new tile floor was laid, walls repaired, storeroom built, and entire room repainted.

Two rooms in the basement of the Center Building which had been used for storage of furniture, etc., were renovated and converted into a barber shop for the West Side patients.

Laundry.—The work of the laundry has increased to such a degree that it is difficult to see how more pieces could be washed and ironed without a larger building, more equipment, and additional employees, or putting the employees on two work shifts.

The number of pieces laundered, dried, and ironed during the year was 14,435,569.

During the year there has been installed an extra drying tumbler to take care of the increased drying of linens.

Culinary department.—The dietetic force, like other departments, has been under pressure due to the increased number of patients.

New coffee urns and electric refrigerators have been installed in both Howard Hall dining rooms.

An electric refrigerator was installed in the diet kitchen of the Nurses' Training School.

Electric can openers have been put in use in general, detached, Toner, and continuous-treatment kitchens.

Food carts, upright vegetable steamers, electric oven, gas ranges, a coffee and tea urn, and bain-marie tables have been ordered to complete the installation of the continuous-treatment kitchen. When this kitchen was first opened for operation it was only half equipped. It is now cooking for 1,400 patients and reached the limit of the amount of work that could be turned out with this equipment. Additional equipment was ordered and is being installed.

An upright vegetable steamer has been installed at the employees' cafeteria, and two for the general kitchen.

Classes in dietetics were taught from March 20 to June 30, inclusive. There were 28 students in the class.

Visits are made regularly by the dietitians to the dining rooms in each service.

Creamery.—During the year the dairy pasteurized 280,936 gallons of milk, a daily average of 770 gallons. About 1,100 quarts of milk

were bottled daily; the remainder was canned for use in the kitchens and bakery and for making ice cream. Altogether, 51,500 gallons of milk were purchased.

An average of 20 gallons of buttermilk was made daily by the cultured starter method.

The ice-cream department manufactured a total of 26,448 gallons of ice cream, a daily average of 72 gallons.

Heating and plumbing department.—A new refrigerating machine was installed in the laboratory.

New valves and gauges have been installed in the various hydrotherapeutic departments and on the shower baths throughout the hospital.

At the dairy barns a complete system of water supply to the drinking cups used by the cows has been installed to replace old pipe lines that were in bad condition and leaking.

There has been installed a pipe line from No. 2 deep-well pump to the reservoir at the water-pumping plant. On completion of this well it will give the hospital approximately 2,000,000 gallons a day of clear, cold spring water for its use. At the present time the hospital is consuming about 1,250,000 gallons of water each day.

Electrical department.—The work of the electrical department has continued to grow, not only being required to provide hospital radio service for the patients in the various buildings but many of the patients have their own private sets which are installed under the supervision of the hospital. Fourteen such sets were installed during the year.

Automatic telephone.—The hospital automatic telephone system traffic amounted to 1,470,480 calls, the daily average being 4,028, and the hourly average 167.

NEW LEGISLATION

In the last report reference was made to Public, 582, Seventy-fifth Congress, providing a new procedure for commitments to St. Elizabeths Hospital. Chiefly, this act set up a commission on mental health as an arm of the court to hear evidence and make recommendations to the court regarding the commitment of persons alleged to be suffering from mental disorder. The compulsory jury trial which had previously been a disgrace was eliminated, although the subject or anyone on his behalf may still demand such trial. It is significant that in only about 4 percent of the cases heard by the commission has this right been exercised—a fact which illustrates effectively the unnecessary nature of the previous procedure. It was recognized at the time of passage of

Public 582 that certain defects were present in the legislation, especially the requirement that 10 days must elapse between the recommendation of the commission and the issuance of an order of commitment by the court. As a result, the admission of patients in need of the care available at St. Elizabeths Hospital has been unnecessarily delayed, and a serious overcrowding has developed in the psychopathic department of Gallinger Hospital. As a result of the public criticism of this provision and its attendant ill results, remedial legislation has been introduced which it is hoped will be enacted and secure a more efficient and humane functioning of the process of commitment of the mentally ill.

NEEDS OF THE HOSPITAL

An estimate of \$1,281,150 for the support, clothing, and treatment of patients in St. Elizabeths Hospital for the fiscal year ending June 30, 1941, is recommended. This is \$53,870 more than was appropriated for 1940, and is based on an average of 1,950 patients at the same per capita rate of \$1.80 per day, or \$657 per annum. On June 30, 1939, there were 2,013 patients on the rolls. The average number during the year was 1,932. The number estimated in view of these facts seems very conservative. There was an increase of 306 patients in the hospital on June 30, 1939, as on the same date of the previous year, and it is conservatively estimated that the number to be provided for during 1941 will be 6,450 patients.

In addition to the 1,950 chargeable to the Federal Government and authorized under the Interior Appropriation Act, the number that will be cared for in the hospital during the year 1941 are: 4,150 beneficiaries of the District of Columbia; 90 beneficiaries of the United States Veterans' Administration; 138 beneficiaries of the United States Public Health Service; 15 beneficiaries of the United States Soldiers' Home; and 107 beneficiaries of the Indian Bureau.

The rate estimated for the care of the patients during 1941 is \$1.80 per capita per day, the same as for the past 5 years, notwithstanding the increase in the cost of some of the supplies and the change in legislation increasing vacation, sick leave, and holidays, which has a tendency to increase the cost.

Included in the estimate is \$185,000 for repairs and improvements to buildings and grounds, the same amount that was included in the past several years. Out of this sum must come funds for keeping the various buildings in repair, including plumbing, heating, steamfitting, plastering, painting, flooring, and for the repair and widening of roads and walks.

The hospital continues to grow. The admissions are increasing, and there is still a shortage of beds. At least 1,000 beds should be provided to cover immediate needs and to include the replacement of the semi-permanent group of buildings which were erected in 1918, with an estimated life of from 15 to 20 years. This semipermanent group which has 530 beds is in a rather dilapidated condition and far from fire-proof. The cost of repair is increasing, and the hazard from fire is considerable. I consider this recommendation a pressing urgent one.

The increase in population of 306 during the past year more than offsets additional beds previously authorized. At the present time the hospital has practically no available beds and it will be necessary to put additional beds in various wards to take care of new patients as received.

In a report of the National Resources Committee for May 1938, on *The Problems of a Changing Population*, is found the following statement:

More than half the occupied hospital beds in this country are assigned to patients suffering from mental diseases. The social, economic, and medical aspects of these diseases, whereof the causes are still largely unknown, are very serious. They deserve the most intensive study.

The report well states the future of mental institutions and shows that provision must be made for additional beds, as well as for active research.

Two of the continuous-treatment buildings are to be located adjacent to the continuous-treatment kitchen where provision has been made for the preparation and service of food; dining rooms will have to be provided and a tunnel connection to the kitchen so that the food may be brought to the building. It is planned to have cafeteria service in the dining rooms attached to these buildings. The same condition applies to the three buildings that are suggested to replace the semi-permanent group. Ground room is available for these buildings.

Based on bids received on the last buildings, it is believed that \$350,000 will be required for each of these buildings, which will have a slightly increased number of beds. The first buildings of this class contained 162 beds; the new buildings, it is estimated, will have 200 beds.

There is an estimate of \$150,000 for one additional 750-horsepower boiler with the necessary utilities. The hospital recently installed three 750-horsepower boilers, which were sufficient for its needs at that time. Space was left for one additional boiler which would be required when the new buildings were erected. The growth of the hospital requires the additional boiler as soon as arrangements can be made for its erection. Out of this amount also to be provided

is one ammonia air compressor for use in the refrigeration and ice plant. Two small compressors have been in use many years and have reached the maximum of their capacity. In order to supply the needs of a largely growing institution this additional compressor is urgently required.

Expenditure of \$750,000 has been estimated for a building for storeroom, warehouse, laundry, and industrial shops, including preparation of plans and specifications, advertising, supervision of construction, and equipment.

The present storeroom was built more than 30 years ago. Since that time the population has very nearly tripled, but no change has been made in the storeroom and warehouse. The present storeroom, with cold-storage equipment, is practically out of date and the storage facilities are insufficient to care for adequate quantities of current supplies. In order properly to house supplies that must be cared for and regularly issued to the various buildings and industries, all sorts of out-of-the-way places have been utilized. The basements of many buildings housing patients have been used for storing furniture. The District Fire Department properly objects to this procedure. It is difficult to give proper protection to articles in all classes of buildings, and there is possibility of shrinkage.

When the present laundry building was erected, the total amount of material washed and laundered each year was about 3,000,000 pieces. This has increased until during the past year over 14,000,000 pieces were washed and laundered. It has outgrown the original building; small additions have been put on each side, but it is necessary to furnish more room. Over 150 patients and 41 employees work in this building. It is contemplated, if a new building is authorized, to make space at one end of the first floor of this building for the laundry. Such authorization is urgently recommended, and the Board of Visitors desires to add its most emphatic endorsement.

There is an estimate of \$950,000 to purchase farm land, to construct buildings to house patients who would work on the farm, to construct buildings to house employees, for the farm animals, including dairy, piggery, poultry plant, a building for pasteurizing milk, making ice cream, and other necessary farm buildings, including expenditures for the purchase of land, preparation of plans and specifications, advertising, and supervision of construction.

The hospital consists of four plots of land, in all about 800 acres. The last land purchased for hospital use was in 1891. At that time the hospital had about 1,500 patients, and over 600 acres were used for farm and garden purposes. The hospital, while originally iso-

lated some miles from the center of the city, at the present time on account of the growth of the city and the use of various forms of traffic, is now adjacent to the city and is surrounded by a growing population. The dairy and piggery are in proximity to buildings occupied by patients, and the dairy barn is adjacent to Nichols Avenue, a thoroughfare running through this section of the city, both the dairy and piggery being the subject of a good deal of complaint on the part of the inhabitants of this section.

One part of the farm is located about a half mile from the main site, in what is known as Congress Heights. Certain groups have recommended that a portion of this ground be turned over to the National Capital Park and Planning Commission for playgrounds for children, and that another part be turned over to the District of Columbia for streets and roads. Parts of this same site have been taken by the city for widening streets. We have application on file at the present time requesting permission to run open drains through this land from three points of entrance, to take care of the District drainage water. It will readily be seen that the hospital must oppose all taking of land until additional land is obtained.

Another plot of the hospital is about $4\frac{1}{2}$ miles from Washington; a portion of it is on low land, sometimes under water.

It is believed desirable to obtain approximately 5,000 acres of land, to concentrate all farm projects in one place, increase the size of the dairy herd, the piggery, and the poultry farm, and build about 6 cottages, housing 40 patients each, on this site. This arrangement would permit an increased number of patients to derive the therapeutic benefits of healthful outdoor occupation. This would also prove an economic arrangement, in that the hospital would be able to secure sufficient milk for all purposes, to increase the quantity of pork products and probably to cure pork products, thus reducing the quantity of ham, bacon, and shoulder to be purchased, and also increase the quantity of poultry products, such as fowl and eggs. Furthermore, the removal of the farming activities from the Nichols Avenue site would make available a considerable area of valuable land which could be used for further buildings and for other activities closely related to the immediate problem of the care of patients.

The hospital has no particular site in view, but preliminary studies indicate that such a site could be secured within from 10 to 20 miles from the main plant.

There is an item of \$300,000 for a new nurses' home. The original Nurses' Home was built in 1903, and opened for occupancy in 1905. At that time the hospital had about 2,200 patients. It had a 2-year course in the Training School for Nurses, and practically no regis-

tered nurses. At the present time it has 6,300 patients, has just reopened a 3-year course in the Training School, accepts affiliates from the other nurses' training schools in the District and vicinity and postgraduates from similar schools to give them a course in mental training. The original Nurses' Home is filled with female nurses and another building, formerly used by patients, has been remodeled for male students. In addition to these, rooms in out-of-the-way places are used for nurses who are required to live on the grounds to meet emergencies. We have now reached the limit of our capacity, and recommend that an appropriation of \$300,000 be authorized for a new home to be erected on the grounds east of Nichols Avenue, where the new construction is in progress.

There is an item of \$150,000 to provide a chapel for holding religious services. The chapel at present in use is on the third floor of what is known as the old Center Building, erected partly in 1855 and partly in 1872. The chapel being on the third floor makes it inconvenient, if not impractical, for many of the patients to attend as there is no elevator in this building. The growth of the institution has been away from the old Center Building, and it is proposed to erect a chapel on ground on the east of Nichols Avenue to provide an adequate place for religious services.

STAFF CHANGES JULY 1, 1938, TO JUNE 30, 1939

The following appointments were made during the year:

First assistant physician: Riley H. Guthrie.

Psychiatric residents: Louis A. Cohen, Laura E. Ehrlich, Samuel P. Hunt, L. G. Johnson, Sydney B. Maughs, and Angelo M. May.

Internes: Ewin S. Chappell, Robert C. Hecker, James R. Hurley, Samuel W. Joel, Milton H. Layden, Vincent Marchese, Charles Silverberg, and Oswald V. Todd.

Visiting ophthalmologist: Robert F. Costello.

The following resignations took effect during the year:

Psychiatric residents: L. G. Johnson, Marion S. Love, Angelo M. May, and Burnell V. Reaney.

Internes: John H. Austin, David Brezin, and Robert E. Kennedy.

PUBLICATIONS

Overholser, Winfred, Superintendent:

Saint Elizabeths Hospital (with Capt. E. H. Parsons, Medical Corps, United States Army). The Military Surgeon, vol. 83, No. 3, Sept. 1938, pp. 227-234.

The Early Treatment of Mental Disorders. The Journal of the Michigan State Medical Society, vol. 37, No. 10, Oct. 1938, pp. 883-893.

The Psychiatrist in Court. (Presented before the Academy of Medicine of Washington, May 14, 1938). The George Washington Law Review, vol. 7, No. 1, Nov. 1938, pp. 31-51.

- Contribution to: The "Lie Detector," Opinions as to Use and Value of the Polygraph. *American Journal of Medical Jurisprudence*, vol. 1, No. 4, Dec. 1938, p. 258.
- Understanding the Child as a Person. *National Parent-Teacher*, vol. 33, No. 5, Jan. 1939, pp. 30-33.
- The Troubled Mind, by C. S. Bluemel. (Book review.) *Scientific Monthly*, vol. 48, No. 1, Jan. 1939, p. 85.
- Crime and the Community, by Frank Tannenbaum. (Book review.) *Mental Hygiene*, vol. 23, No. 1, Jan. 1939, pp. 143-145.
- Discussion of "Misconceptions of Legal Insanity" by Dr. Gregory Zilboorg. *Proceedings New York Neurological Society, Regular Meeting*, Oct. 4, 1938. *Journal of Nervous and Mental Disease*, vol. 89, No. 2, Feb. 1939, pp. 217-220. Also published in *Archives of Neurology and Psychiatry*, vol. 41, No. 2, Feb. 1939, pp. 429-430.
- Some Problems in Psychiatric Expert Testimony. *American Journal of Medical Jurisprudence*, vol. 2, Feb. 1939, pp. 76-83.
- Mental Disease—A Challenge. *The Scientific Monthly*, vol. 48, No. 3, Mar. 1939, pp. 203-209.
- Out of my Life and Work, by August Forel. (Book review.) *American Journal of Psychiatry*, vol. 95, No. 5, Mar. 1939, pp. 1254-1255.
- Manual of Psychiatry and Mental Hygiene, 7th edition, by Aaron J. Rosanoff. (Book review.) *Journal of Criminal Law and Criminology*, vol. 29, No. 6, Mar.-Apr. 1939, p. 925.
- Alcohol and the Individual. (Book review: *Alcohol: One Man's Meat*, by Edward A. Strecker and Francis T. Chambers, Jr.) *Scientific Monthly*, vol. 48, No. 5, May 1939, pp. 468-469.
- Ueber Gewalttätigkeitsverbrecher und Ihre Nachkommen (Violent Criminals and Their Offspring), von Dr. Med. Habil. Konrad Ernst. (Book review.) *American Journal of Psychiatry*, vol. 95, No. 6, May 1939, pp. 1469-1470.
- White, William A., late Superintendent:
- Mental Hygiene. (Condensed from *Scientific Monthly*.) *Psychology Digest*, vol. 2, No. 9, Nov. 1938, pp. 65-68.
- In Defense of Psychoanalysis. (Reprinted by permission N. Y. Herald Tribune Magazine.) *Psychology Digest*, vol. 2, No. 11, Feb. 1939, pp. 2-4 and 91.
- Eldridge, Watson W., Principal Medical Officer: Luetic Osteitis Simulating Malignant Disease. (With A. H. Ungerman and W. H. Vicary.) *American Journal of Roentgenology*, vol. 40, No. 2, Aug. 1938, pp. 224-229.
- Katzenelbogen, Solomon, Director of Laboratories:
- Discussion of: "Percental Relationship Between Blood Sugar and Spinal Fluid Sugar in Mental Disease," by E. P. Johns and G. H. Stevenson. *American Journal of Psychiatry*, vol. 95, No. 1, July 1938, pp. 129-130.
- Insulin Treatment in Schizophrenic Patients, Clinical and Biochemical Studies. (With H. E. Harms and others.) *American Journal of Psychiatry*, vol. 95, No. 4, Jan. 1939, pp. 793-797.
- Metrazol convulsions in Man, Clinical and Biochemical Studies. (With M. W. Brody, M. Hayman, and E. Margolin.) *American Journal of Psychiatry*, vol. 95, No. 6, May 1939, pp. 1343-1348.
- Hypochondriasis. *Medical Annals of the District of Columbia*, vol. 8, No. 5, May 1939, p. 147.

- Lind, John E., Senior Medical Officer: Mental Disorder as Seen in General Practice. *Medical Annals of the District of Columbia*, vol. 7, No. 8, Aug. 1938, pp. 257-260.
- Murphy, John P. H., Senior Medical Officer: Progress, Science and the Mind; a History of St. Elizabeths Hospital. *Medical Annals of the District of Columbia*, vol. 7, No. 10, Oct. 1938, pp. 313-323.
- Hoffman, Jay L., Assistant Medical Officer: Hydrotherapy in the Treatment of Mental Disease. *Medical Record*, vol. 149, No. 11, June 7, 1939, pp. 382-385.
- Parsons, Capt. E. H., Medical Corps, United States Army: Saint Elizabeths Hospital (with Dr. Winfred Overholser). *The Military Surgeon*, vol. 83, No. 3, Sept. 1938, pp. 227-234.
- Haydon, Edith M., Superintendent of Nurses: The Status of Psychiatric Nursing in the United States and the Present Facilities for Training both Student and Graduate Nurses for this Branch of Work. "Bits of News" from Headquarters, Graduate Nurses' Association of Virginia, vol. 7, No. 2, July 1939, pp. 32-36.

VISITORS

As has been the case for many years in the past, the hospital has been honored during the year by the visits of many physicians and other professional workers who have known of the activities of the hospital and who have desired to obtain first-hand knowledge of the methods employed there in caring for the mentally ill. In addition to many who have travelled from other parts of the United States (including Puerto Rico), the following foreign countries have been represented: Canada, Mexico, China, Denmark, England, Greece, Netherlands, Scotland, Sweden, Switzerland, and Union of South Africa.

ACKNOWLEDGMENTS

The American Red Cross has rendered invaluable aid to the hospital and to its patients. The closest cooperation between the Red Cross and the hospital has continued, and it is a pleasure to acknowledge this indebtedness. It would be difficult to imagine the successful functioning of the hospital without the assistance and encouragement of this fine organization.

The various veterans' organizations, particularly the American Legion and its Auxiliary, have been most helpful in providing entertainment and personal attentions to the patients.

To those various friends and former associates of the late Dr. William A. White, who made possible the gift of the fine portrait of Dr. White, deepest thanks are expressed. The portrait is a splendid memorial to a great man who did much not only for St. Elizabeths Hospital but for the intelligent and humane care of the mentally ill the country over.

Deepest gratitude is also expressed to Mrs. William A. White for the gift of Dr. White's valuable personal library to the hospital,

and for the specially designed bookplate which she has presented for the purpose of suitably marking the books. The library is valuable, not only for its intrinsic worth, but as a constant reminder of the outstanding psychiatrist who owned and used the books to such telling advantage as working tools.

It would be pleasant to record by name the many officers and employees who have rendered conspicuous service to the hospital during the year just past, but space does not permit. Notwithstanding the officers and employees of the hospital have done their part and deserve full credit, their continued cooperation is needed and will, I am sure, be forthcoming.

The Board of Visitors have been most generous with their time and advice, and I assure them of my deepest appreciation of their assistance. It has been a constant inspiration to work with them.

To the Honorable the Secretary of the Interior and his immediate assistants it is a pleasure to express sincerest thanks for their never-failing support, assistance, and advice, and to assure them of the continued loyalty of St. Elizabeths Hospital to the high ideals of the Department of the Interior.

COLUMBIA INSTITUTION FOR THE DEAF

Percival Hall, *President*

HEALTH

THERE was little illness among the students and pupils during the year. Surgical attention in a few cases was the principal need on the medical side.

An ample milk supply, practically equal to the highest grade certified milk, was provided from the institution dairy during the year.

COURSES OF INSTRUCTION

The course of instruction remained very much the same as in the year previous. Further opportunity for practice teaching and the study of psychology was afforded.

NEEDS OF THE INSTITUTION

The dormitories of the institution are taxed to the limit, and practically all extra space in the residences of instructors also has been utilized. A building containing a library, printing office, and class rooms should be provided. Two more residences for instructors, an addition to the gymnasium building, the extension of the laboratory building, and new units for the Kendall School dormitories and class rooms also are needed.

RESEARCH WORK

Provision has been made for research work by a very capable and experienced educator of the deaf. Equipment for testing of sight and hearing has been provided, and the regular work of testing the ability and achievement of the students of the institution has been enlarged and extended. Other institutions have asked assistance of this department in adjusting their curricula.

SPECIAL GIFTS

A gift of \$4,000 from a group of women alumni, the income of which shall be used for scholarships, has been received during the year; also a gift from Mrs. Charles R. Ely, of \$2,000, for the establishment of scholarships in memory of her husband, Dr. Charles Rus-

sell Ely, who was vice president of the institution and who died recently after many years of splendid service.

SEVENTY-FIFTH ANNIVERSARY

During the year the seventy-fifth anniversary of the higher department of the institution—Gallaudet College—was celebrated by special services conducted by the students, by a radio broadcast, and by special commencement exercises, at which nearly one hundred colleges and learned societies were represented.

PRESENTATION DAY

On Presentation Day, 8 students received the degree of master of arts in course; 10 students, bachelor of arts; and 8 students, bachelor of science. Honorary degrees were conferred as follows: Master of arts—Selwyn Oxley, London, England, and Josephine Timberlake, Washington, D. C.; master of science—Kreigh B. Ayers, Akron, Ohio; doctor of divinity—Arthur D. Bryant, Washington, D. C., and John W. Michaels, Mountainburg, Ark.; doctor of pedagogy—Tom L. Anderson, Council Bluffs, Iowa, and Joao Brazil Silvado, Rio de Janeiro, Brazil; doctor of humane letters—Frank Milton Driggs, Ogden, Utah, Giulio Ferreri, Milan, Italy, and Stacy Rufus Guild, Baltimore, Md. The address to the graduating class and friends of the college was delivered by Dr. Earl James McGrath, Specialist in Higher Education, American Council on Education.

RECEIPTS AND EXPENDITURES

The total receipts, including balance on hand July 1, 1938, were \$201,404.59. Expenses were \$198,423.45. A reserve of \$201.77 was returned to the treasury, leaving a balance of \$2,779.37.

FREEDMEN'S HOSPITAL

Dr. T. Edward Jones, *Surgeon in Chief*

WE BELIEVE that the greatest achievement during this fiscal period is that in the tuberculosis unit. By an allotment of \$700,000 from the Public Works Administration, there is to be erected a tuberculosis unit of 150 beds. This amount permits not only the construction of the building, but also of its adequate equipment. This is a great step forward because it is the consensus of opinion that the number of beds in the District of Columbia devoted to tuberculosis are all too few. The addition of 150 beds will go a long way towards supplying adequate beds for the treatment of this disease. It will result in a definite benefit to the Negro inhabitants of the District of Columbia, in which group the incidence of tuberculosis is high. The construction of this building is scheduled to proceed on or about September 15, and its completion and occupancy will be on or about July 1940.

Another achievement during the year has been the construction of a new ice plant which not only will give the hospital a sufficient supply of ice, but will, we believe, also supply ice for the tuberculosis unit soon to be completed. Our refrigeration system for the kitchen had long outlived its usefulness, offering a distinct hazard to the health of our patients; to say nothing of the loss of food-stuffs because of inadequate preservation. Installation of the modern refrigerating system removes the health hazard and affords proper food care.

The antiquated plumbing throughout the institution, more than thirty years old, has been replaced.

The old X-ray equipment, more than twenty years old, has been replaced by modern X-ray appliances which enable the hospital to give to its patients the latest and best treatment along Roentgenologic lines.

The hospital has been greatly improved by the restoration of fallen plaster and by the application of paint throughout a large part of the institution.

The increase in personnel and equipment has resulted not only in better nursing care, but has also contributed to more efficient professional care to the patients, and it is to be noted that there has

been a reduction in the death rate. Although the hospital is not completely equipped, the additional equipment secured has been of inestimable value.

GROWTH

The hospital is rapidly outgrowing its capacity to accommodate the increased activities it is called upon to perform. For example, there were 23,560 outdoor visits to our clinics in 1937, 55,304 in 1938, and 73,196 for the fiscal year ending June 30, 1939. The largest individual clinic increase in the out-patient department is the luetic clinic. For the fiscal year ending June 30, 1938, there were 719 new patients treated, and their visits, together with those of the old patients, totaled 11,151. For the fiscal year ending June 30, 1939, there were 924 new patients, with the entire number of visits showing a total of 21,439, or an increase of 10,284 visits over the previous year. The next two largest clinics, the genitourinary and the surgical (including surgical diagnostic clinic), have shown marked increases. The figures for the G-U clinic show 961 new visits for the fiscal year ending June 30, 1938, as against 904 for the fiscal year ending June 30, 1939, and total visits for 1939 of 8,581 as compared with 7,819 for the previous year. There were 7,819 surgical clinic visits recorded for 1939 as against 7,370 for 1938.

These increases in the work of our out-patient department not only have overtaxed the physical accommodations of the hospital, but have placed a tremendous burden upon our limited personnel. If these increases are to be met adequately it is absolutely imperative that our personnel be increased.

INDOOR ACTIVITIES

The increase in the work done by the hospital is reflected not only in our out-patient department, but also in our indoor activities. In substantiation of this statement the total number of indoor patients under care for the fiscal year ending June 30, 1938, was 6,225 as compared with 6,710 for the fiscal year ending June 30, 1939. This increase took place in spite of the fact that some of our beds were inactive because of an insufficient nursing personnel. This insufficiency has been somewhat relieved by an increased appropriation for personnel for the fiscal year 1940 and will permit of the reoccupancy of wards previously inactive. The increase in nurses and attendants, however, is not sufficient to meet the requirements specified by the National League of Nursing Education, not only so far as patient-nursing hours are concerned, but other requirements prescribed by this League, which we must meet if we are

to maintain our school of nursing and preserve its accreditation by all the States of the Union.

It is a common belief, and financial computation seems to support the fact, that our school of nursing represents a financial liability to the Federal Government. However, we believe that this increased expenditure will yield a wholesome dividend in the preservation of the health of the nation. Statistics show that only 272 colored student nurses graduate in the United States during any one year, and Freedmen's Hospital supplies 12% of that number. This number of graduates (272), plus those already engaged in the practice of their profession, gives to the nation one colored graduate nurse to every 5,120 colored citizens; whereas, on the other hand, there are graduated yearly in the United States 5,126 white student nurses, which gives to the nation one white graduate nurse to every 296 white inhabitants of the United States. Therefore, it can be seen that if Freedmen's Hospital were to abolish its training school for nurses, it would greatly reduce the already insufficient number of colored graduate nurses sorely needed for the protection, preservation, and restoration of health in the nation. If the school is to have the necessary accreditation, it must have a greater number of nurses than it now has. The increase will create a housing problem unless there can be an increase in the appropriations sufficient to eliminate the \$360.00 per annum now deducted for quarters and subsistence from the salary of each graduate nurse. In the majority of instances, there is no absolute necessity for these nurses to be quartered on the hospital grounds. If this arrangement can be changed, our present housing facilities probably will be adequate to absorb an increase in the number of graduate nurses.

BLOOD BANK

Another highlight of this fiscal year was the establishment of a blood bank. The use of refrigerated blood has been a boon to transfusion. Formerly, precious hours were lost in securing suitable donors. Now, with the well equipped bank, it is possible to give blood to a patient within a half hour of his arrival. As a result, the number of transfusions performed in the hospital has increased. The percentage of reactions has been remarkably low. The laboratory staff is wholly responsible for the typing and matching of the blood. This staff is called upon for duty at all times, nights, holidays, and Sundays, and its personnel is insufficient.

DIRECTOR OF CLINICS

The authorization and appointment of a Director of Clinics at Freedmen's Hospital has improved the management of our outdoor

department. During the year, our professional staff has undergone reorganization and grading. This step has insured the physicians on the staff of ranks in line with their attainments and length of service.

NEW RECORD SYSTEM

No hospital is better than its records. The types of records, their preservation and availability for reference may serve as a useful measuring rod of the kind of work being performed. Efforts are wasted unless medical records are preserved in such a manner as to be readily available to serve the purposes for which they are intended, namely:

1. After the patient is discharged, the records should be accessible, should he become ill in the future.

2. They serve as a basis for study of the work of the hospital as a whole, as shown in various reports and analyses which enable the governing body to determine the character of the professional care being rendered the patients and the quality of the work being performed by individual members of the medical staff, thereby enabling the governing body to exercise proper care in making future appointments.

3. The disease and operation indexes are of value in medical research.

By authorization of the Secretary of the Interior, an expert made an extended study of our antiquated record forms and filing methods, following which we revised our forms in accordance with the specifications of the American College of Surgeons. Although the new system is not complete, due to the lack of personnel to man further additions, great benefit has resulted from such installations as have been made to date.

The new system is known as the unit history system, and brings together in one folder all hospital admissions regardless of the number of times a patient is admitted. The patient's history records for each admission are kept together. A master index file is maintained and contains a single card for each patient. These cards are filed alphabetically and control the unit history system.

The improvement in record keeping and new forms has served as a stimulus to the attending physician to perform his part in furnishing better histories, more complete work-up of the cases, and prompt progress notes.

In finality, we have the objective of keeping a model medical records department to be presided over by a records librarian. Our method has been selected from many possible ones, as the one most suitable for our present and future needs.

W. P. A. PROJECTS

Three W. P. A. projects—clerical, public health, and cleaning—have been maintained in the hospital. With such an adjunct, we

have been able to accomplish much in the direction of the proper care of noncurrent files and cleaning of the building. Our correspondence, mails, and files division came in for attention during the course of our survey and is due for reorganization. An alphabetical file was set up by Remington Rand, Inc., during this fiscal year, but cannot be maintained effectively until such time as an addition can be made to the clerical force. This file is much more simple in operation than our former one, and also more efficient. The clerical project has rendered invaluable aid and accomplished the following results:

1. The alphabetizing and filing of 200,000 patient cards into one master filing system; the integration of 75,000 out-patient cards into this system; the consolidation into one master patient-index card all information and codings relative to each patient having entered the hospital more than once.
2. The placing in labeled folders and vertical filing of all case history records dated prior to January 1, 1929; the transcription of several thousand of such records in order to insure their existence.
3. The arrangement, classification, codification, and filing of 10,000 old emergency and patient cards.
4. The rearrangement, in chronological sequence, of the hospital census sheets dated prior to January 1, 1936.

On April 24, 1939, the project was reassigned to the hospital to continue for one year from that date, and the following work items now are being executed:

1. Continuation of the work described in work Item 1 of the previously operated project, the completion of which requires the verification and correction of approximately 50,000 cards which, though typed, are of unknown accuracy.
2. The compilation, classification, and filing of pay-roll records dated prior to 1930; the carding and filing, by name, of all employees ever in service; the compilation and due disposition of all additional information pertaining to those employees. The execution of this item is necessary in the computation of retirement benefits, the amelioration of employee claims and in other contingencies.
3. The making of an interfile check in order to insure the presence of a patient index card for each patient case history.
4. The checking of all registers of patients dated prior to January 1, 1936, for their physical condition and against the discrete patient index cards. This work item is important in that it will amend, clarify, and complement our present system of triplicate files.
5. To type onto permanent forms and file the registration and Social Service cards (now written in long hand and affected by age) for approximately 3,000 cases handled by the Social Service Department in the period 1930 through 1935.
6. The sorting, identifying, and assembling of all records now in the old file room, for consideration by the director for their disposal. This and Item No. 2 (compilation of pay-roll data) are in all probability the two major items of this project, for each will require about 1 year to complete.
7. Building from the available material, an index-status file for former student nurses. The material at hand is contained in books compiled on an annual

basis and is dated for the years 1894 through 1936. Such material is important for the clearance of nurses services, and will be used for intrahospital exchange and clearance.

8. Building, according to diagnosis, an alphabetical file of the medical survey cards accumulated prior to January 1936. These data are of vital interest to the United States Public Health Service, are referred to in the hospital's annual report to the Secretary of the Interior, and constitute source material for studies of morbidity rate.

Also the assistance rendered in establishing the unit record system in the department of records and admissions, is noteworthy.

NATIONAL YOUTH ADMINISTRATION PROJECT

The National Youth Administration Project supplied patient attendants in our wards as well as in other divisions of the institution. The services performed have benefited the patients and, in addition, have educated the young patient attendants so they will be able to give efficient service to the community in which they live when their services here have been terminated.

DIVISION OF ACCOUNTS AND COLLECTIONS

The authorization for a survey by the General Accounting Office has resulted in the installation of a standard, uniform accounting system which already has demonstrated its efficiency. It simplifies the preparation of the monthly reports required in government procedure, and presents a daily picture of our financial operation. The stock ledger enables the hospital to keep a better inventory of stock, together with its attendant cost. A correspondence system is contemplated and will be inaugurated as soon as additional clerical service is allowed. We feel that we should extend thanks to the agents of the Accounting Office for their kind cooperation and meritorious service to Freedman's Hospital. We also extend thanks to the Purchasing Office of the Department of the Interior for the aid given in the reorganization of our purchasing department. The general reorganization carried out in the departments of purchasing, stores, and issues will result in a general increase of the efficiency of these units. It is evident that there is need for additional personnel in these departments if the program, as outlined, is to have a proper fruition. Following is a partial statement of the work performed by these departments during the fiscal year ending June 30, 1939:

Number of bids invited.....	498
Total number of bid openings.....	129
Total number of bidders.....	300
Number of formal contracts entered into.....	124
Number of orders placed.....	1,962
Number of vouchers cleared and scheduled.....	1,748
Number of warrants cleared.....	80

Attention is invited to the increase over 1938 in the number of contracts let and orders placed:

	1939	1938
Contracts-----	124	66
Orders-----	1,962	1,293

TELEPHONE SERVICE

The installation of an intercommunication dial system and an additional switchboard position has resulted in improvement in the telephone service.

PERSONNEL

I do not feel that this abstract should be concluded without reference to our personnel, regarding its excellence of performance and cooperation, the existence of harmonious relationships, on their part as well as their willingness to give overtime duty and postpone vacations in the interest of the hospital. The necessity, however, for overtime should not be continued, because it is felt that it will impair the efficiency of the personnel concerned.

BUSINESS MANAGER

There is urgent need for a business manager. The business management now devolves upon the Surgeon in Chief of the hospital, who is assisted by the Chief Clerk. The professional and clerical administration of the hospital are of sufficient magnitude to require the full attention of the Surgeon in Chief and the Chief Clerk. Therefore, we believe that the appointment of a business manager would result in better business procedures and a distinct saving to the Government.

We cannot but be grateful to the Honorable, the Secretary of the Interior, to the Budget Bureau, and Members of Congress for their proper interpretation of our needs. We sincerely appreciate the increases granted both as to personnel and for maintenance and operation cost. Although the hospital is still undermanned and not fully equipped, we are hopeful that the appropriation for the fiscal year 1941 will permit us to attain the goal which we seek. The national scope of the hospital is indicated by the fact that 35 percent of the patients during this fiscal year were drawn from the States.

HOWARD UNIVERSITY

Mordecai W. Johnson, *President*

GENERAL TREND OF THE UNIVERSITY

THE year 1938-39 was the seventy-sixth year of the emancipation of the slaves, the seventy-second year of the operation of Howard University, the sixtieth year of the Government support of Howard University, the tenth year since the passage by Congress of the basic law authorizing annual appropriations in support, construction, and maintenance of the university, and the eighth year of the Government's 10-year program to establish Howard University on a sound basis of functioning as a first-class university service.

Student body and resources.—In the year 1938-39 Howard University had a student body of 2,393 persons from 40 States and 17 foreign countries, a faculty of 244 teachers (equivalent to 171 on full time), and awarded degrees to 271 graduates in 10 schools and colleges, including the graduate school, the college of liberal arts, the school of engineering and architecture, the school of music, the college of medicine, the college of dentistry, the college of pharmacy, the school of law, the school of religion, and the summer school. The institution had a physical plant valued at \$7,315,830, total assets of \$9,527,896, an income for current purposes of \$1,147,860, and was receiving the support of the Congress of the United States, the Public Works Administration, the Works Progress Administration, the National Youth Administration, the General Education Board, the Rosenwald Fund, and other private foundations and individuals in a cooperative effort to establish its work on a basis of first-rate functioning.

Status of progress under the 10-year plan.—During the period since the passage of the substantive law in 1928, including 8 years of the 10-year program, the capital assets of the university had been more than trebled, its book collection more than doubled, its movable and flexible scientific and educational equipment modernized and trebled, the total number of teachers increased by 51 percent, the total number of full-time teachers increased by 88 percent, so as to place 90 percent of instruction in their charge; and the university as a whole had moved 72 percent of the way toward a first-class faculty and administrative staff, 67.5 percent of the way toward first-



OUTSTANDING EDUCATIONAL ADVANTAGES PROVIDED AT HOWARD UNIVERSITY IN WASHINGTON, D. C.
Partial view of campus, showing, right to left, new Library Building, Chapel, Thirkield Hall, and the Chemistry Building.



class adequacy in flexible and educational scientific equipment and supplies, and more than 50 percent of the way toward a first-class educational plant.

Physical-plant improvements.—During the year two main buildings were under construction. The new library building, made possible by a Federal Emergency Public Works allotment of \$1,105,000, was finished, dedicated as the Founders' Library, and turned over to the university by the Secretary of the Interior. The building received its first use during the year, and was widely acclaimed by librarians as one of the best buildings for the purpose in the Nation.

The new men's dormitory buildings, under Public Works Administration contract for \$646,200, were nearing completion and expected to be ready for occupancy in December 1939.

Through funds of the Works Progress Administration the grounds of the university were being extensively planted with trees, shrubbery, and grass, permanent walks were being laid in the undergraduate and graduate quadrangle, and the exteriors of all but two of the buildings on the main campus were being painted.

Increased numbers and caliber of students and graduates.—Enrollment increased in 1938-39 by 153 students from 2,140 to 2,393, being a total gain of 767 students since the low point of the depression in 1933-34. The university was being fed at its base (the college) by 201 high schools and at its summit (the graduate school) by 72 colleges and universities. Seventy percent of all students in the professions of medicine, dentistry, pharmacy, law, and religion were holders of college degrees and 661 or 27.6 percent of all students in the university were persons holding one or more advanced degrees.

Graduates.—Graduates during the year increased by 21; that is, from 250 in 1937-38 to 271 in 1938-39. An outstanding index of the improved caliber of work being done in the institution as a result of the 10-year program is afforded by the increasing success of Howard University's medical graduates before State examining boards. Thirty-four Howard University medical graduates were examined by 12 State boards in the United States during the year. Thirty-three passed and one failed. The percentage of failures was 2.9 percent as compared with 8.5 percent for 1937.

Distinguished awards to student activities.—The Hilltop, a newspaper published by the students of Howard University, received the Brawley cup as being judged the best student newspaper printed in a Negro college, and it also received second-place honors in the Associated Collegiate Press Exhibition, being adjudged the next best college newspaper printed in the United States. The Howard Players' production of *Rehearsal*, by Albert Moltz, was adjudged the best

production in the Negro Collegiate Dramatic Association Festival, held at Virginia State College, at Petersburg, Va., on April 13, 1939.

Further advance in the graduate school.—The graduate school enrolled 407 students during the year, an increase of 81 over 1937–38. The rapid development of high schools in the South and the accrediting movement of high schools and colleges by the Southern Association of Secondary Schools and Colleges are making an increasing demand for teachers with graduate training of high caliber. Howard University is the oldest of the Negro institutions in point of the development of graduate work, the largest in point of enrollment, and apparently the most advanced in the matter of resources for further development. It clearly stands out as the most promising center for graduate instruction.

Medical school advances and renders important clinical services.—Through Government appropriation and the help of the General Education Board the university is moving toward decisive improvement in the full-time staff of clinical medicine. The increased appropriation of the Congress in 1939–40 made possible the appointment of a full-time associate professor in obstetrics-gynecology, and a full-time assistant professor in pediatrics. The General Education Board has granted fellowships to three able men who are preparing themselves on the graduate level for teaching and medical service in surgery, neuropsychiatry, and thoracic surgery.

These advancements in the clinical staff of Howard University serve at once to improve the professional care of patients in the Freedmen's Hospital and are enabling the university and the hospital to begin the development of professional services of major significance.

(1) Under the sponsorship of the National Tuberculosis Association the college of medicine held the first annual conference on Negro Tuberculosis Workers on June 5, 6, and 7.

The 150-bed tuberculosis annex to be erected at the Freedmen's Hospital under provision of a grant of \$600,000 by the Public Works Administration through the Department of the Interior will serve as a valuable center for Howard University in the field of tuberculosis.

(2) The postgraduate course in venereal-disease control introduced last year was conducted again this year through a grant of \$13,500 made by the United States Public Health Service.

(3) The university continued cooperation with the Freedmen's Hospital and the Health Department of the District of Columbia in the conduct of a prenatal and maternal welfare clinic.

(4) As a part of its training program, the faculty of dentistry continued to conduct a low-cost public clinic, available to school children

and persons of limited means. During the year 1938-39, this general clinic recorded 4,938 visits. In the surgical clinic, 1,498 others; and in the X-ray department, 948. Two thousand four hundred and thirty-one new patients came to the clinic.

School of law gives decisive help in important civil rights cases.—In the school of law, members of the faculty rendered constructive help in the preparation and argument of two major cases dealing with the protection of the constitutional rights of the Negro minority. In one of these cases the Supreme Court made a far-reaching decision bearing upon State-supported educational opportunities for Negroes. In the other case the Supreme Court judicially recognized and condemned registration devices designed to withhold from Negro citizens their constitutional right to vote.

Division of the social sciences.—The university has developed an able division of social sciences with a teaching and research staff of 29 members in economics, political science, sociology, history, philosophy, social work, and commerce and finance. This staff not only functions efficiently in the matter of teaching the social sciences on the undergraduate and graduate level, but it has shown research ability of high caliber and is being increasingly called upon by distinguished institutions of the public life for participation in cooperative research bearing upon public problems.

Faculty publications and research.—The members of the faculty of liberal arts during their tenure at the university have brought out 847 scholarly publications, including 62 books and monographs, 531 articles and papers, 161 book reviews and 93 other creative contributions such as poetry, plays, paintings, etc. The entire faculty of the university during the current year put forth 8 books, 104 scientific and scholarly articles, and 21 book reviews. Among these contributions was the continued publication of the *Journal of Negro Education*, now one of the most helpful publications in the United States, in the field of education. The annual number of this journal for July 1939 carried a comprehensive study by a large group of scholars on all major aspects of the relations of the Negro minority to American life.

Practical bearing of faculty research.—(1) The investigation of important problems in botany and agriculture has long been handicapped by the difficulty, almost the impossibility, of studying root growth and balance without disturbing the plants and interfering with their normal development. Such investigations have been greatly simplified and facilitated by the development in the botanical laboratory of Howard University of a new method of growing plants—Wick-culture method, which makes possible observation and study of the details of

root growth without disturbing them in any way and with a simplicity and ease in which this could never be done before.

Experiments by this method have already given more highly illuminating and significant results. The apparatus was exhibited at a meeting of the American Association for the Advancement of Science at Ottawa (1938). The work has been noticed in several releases by Science Service. The method has been included in the Manual of Methods in Plant Physiology, by Loomis (University of Iowa) and Shull (University of Chicago). The apparatus is patented and is being manufactured by the American Instrument Co., Silver Spring, Md., and is in use for instruction and research in quite a number of universities, including George Washington University.

This is but one of many possible examples of the practical bearing of research at Howard University on the life of the people.

(2) A member of the faculty of the school of engineering and architecture has patented "An optical apparatus for determining the position of a tool." This invention makes possible the creation of an object in metal directly from a drawing of the object.

(3) The university has believed that careful research on the more important phases of Negro life and relationships would tend to cast illumination on the entire area of human life. This faith has begun to bear fruit in the researches of the faculty. A member of the staff of sociology, for example, has just completed a study of "The Negro Family in the United States." An eminent sociologist of the University of Chicago has declared this study to be "* * * the most valuable contribution to the literature on the family since the publication 20 years ago of *The Polish Peasant in Europe and America*, by W. I. Thomas and Florian Znaniecki."

New library instruments facilitating the study of the Negro.—Through the cooperation of the Works Progress Administration, the university has completed two new instruments which will give invaluable assistance to scholars throughout the Nation in their study of the social questions affecting the Negro and race relations. They are: (1) The completion and publication of a complete 500-page catalog of the books by and about Negroes which may be found in the Moorland Foundation collection of the library of Howard University; and (2) the completion of the union catalog of items by and about Negroes to be found in 10 different libraries, containing about 30,000 cards and providing a clearing house of about 100,000 publications.

Outstanding needs of the university.—The outstanding needs of the university, made increasingly clear during the year, were: (1) Immediate increases in the number of teachers in the graduate school

and in the clinical branches of medicine; (2) an increase of 29 in the number of mature teachers of professorial rank; (3) a sum of \$92,000 to make important supplements to the gravely deficient book collection in our library; (4) the doubling of funds for scholarship and student aid, especially for teachers in the South, who receive low salaries and may not otherwise find it possible to pursue the graduate work which they need to increase their efficiency; (5) proper organized relationships with the Freedmen's Hospital so as to enable the school of medicine to operate on a sound basis; (6) increased funds for at least that minimum of research which is necessary to maintain a living mind in the members of the teaching staff; and (7) the following buildings: (a) an auditorium accommodating at least 3,500 persons; (b) a modern building and equipment for the work in dentistry; (c) an administration building for the centralization and proper interrelation of the administrative services of the university; and (d) a biology building and greenhouse.

STUDENTS

University enrollment.—The total enrollment for the year 1938–39 was 2,393 (see table following), of whom 1,173 were men and 1,220 were women, as compared with an enrollment of 2,240 for 1937–38, of whom 1,119 were men and 1,121 were women. This enrollment represents a net gain of 153 students, or 6.8 percent. It represents also a total gain of 767 students since the low point of the depression in 1933–34.

Geographical distribution.—Of the regular students enrolled for the school year 1938–39, 95.9 percent came from the continental United States and 4.1 percent from without the borders of the United States. These percentages are the same as those for the school year 1937–38. The percentage of students coming from the District of Columbia was 26 percent as compared with 25.6 percent for the school year 1937–38.

Forty States sent 2,179 candidates for degrees in 1938–39 as compared with 42 States sending 2,048 candidates for degrees in 1937–38. The regional distribution of candidates for degrees is as follows: From the North, 528 students, as follows: New England, 53; the Middle Atlantic States, 325; the East North Central States, 103; the West North Central States, 47. From the South, 1,640 students, as follows: The South Atlantic States, 1,342; the East South Central States, 169; and the West South Central States, 129. From the West, 11 students, as follows: Mountain States, 4; Pacific States, 7.

Summary of Students Enrolled in Howard University for the years 1938-39 and 1937-38

Division of the university	Net enrollments						Total gain	Total loss
	1938-39			1937-38				
	Total	Men	Women	Total	Men	Women		
THE COLLEGES								
College of liberal arts.....	1,383	583	800	1,332	586	746	51	
School of engineering and architecture.....	59	59	0	50	50	0	9	
School of music.....	92	33	59	98	31	67		6
Graduate school.....	407	164	243	326	121	205	81	
Total.....	1,941	839	1,102	1,806	788	1,018	135	
PROFESSIONAL SCHOOLS								
School of religion.....	25	25		23	20	3	2	
School of law.....	70	69	1	74	72	2		4
School of medicine:								
College of medicine.....	154	142	12	154	142	12		
College of dentistry.....	51	45	6	48	41	7	3	
College of pharmacy.....	31	29	2	29	29	0	2	
Total.....	331	271	60	328	304	24	3	
Total in regular courses.....	2,272	1,149	1,123	2,134	1,092	1,042	138	
Special students in music, religion, law, and dentistry.....	132	32	100	130	38	92	2	
Total.....	2,404	1,181	1,223	2,264	1,130	1,134	140	
Less duplications.....	11	8	3	24	11	13		13
Grand total (net).....	2,393	1,173	1,220	2,240	1,119	1,121	153	

Seventeen foreign countries sent 93 candidates for degrees during the school year 1938-39, as compared with 15 foreign countries with a total of 87 candidates for degrees in 1937-38. As usual, the largest group of foreign students (47) came from the British West Indies. Nine came from the Virgin Islands, 8 from British Guiana, 6 from Panama, 5 from Canada, 4 from Africa, and 4 from Puerto Rico.

Students of graduate caliber.—Two of the professional divisions, namely, pharmacy and dental hygiene, receive students on the basis of regular college entrance requirements. Medicine, dentistry, law, and religion require definite amounts of college work. Of the 89 students entering the regular freshman classes of medicine, dentistry, law, and religion in 1938-39, 72 or 80 percent entered with college degrees. Two hundred and thirty-three or 75 percent of the 308 students in these 4 professional schools are degree-holding students. Of the 2,393 students in the entire university, 661 or 27 percent are persons holding one or more advanced degrees as compared with 564 or 25 percent in 1937-38.

Scholarships and student aid.—Scholarships within the university continued to be administered on the basis of an allotment of 7½ percent of all students' fees, as provided by the trustees of the university.

During the past year the committee on scholarships and student aid received about 1,200 applications for student aid. Only two criteria governed the award of student aid: (1) Need and (2) scholarship average.

The committee on scholarships and student aid awarded tuition or work scholarships to 564 students, which constituted 23.5 percent of the student body. Of these 213 received aid from the National Youth Administration at an average of \$124.58 per student. The total amount available for scholarships from all sources was \$62,604.81.

Limited funds required the university to turn away without assistance many deserving students. There is urgent need for more funds for scholarships and student aid.

GRADUATES

Number and distribution.—The following table exhibits the number of graduates from each division of the university during 1938-39. There were 271 graduates coming from 30 States, the District of Columbia and 6 foreign countries. The total of 271 students graduating in 1938-39 represents an increase of 21 graduates as compared with 250 for 1937-38. There were 147 male graduates and 124 female graduates as compared with 134 and 116, respectively, for the year 1937-38.

Honorary degrees.—Three honorary degrees were conferred at commencement on June 9, 1939. The degree of master of science was conferred on Matthew Alexander Henson, explorer; and the degree of doctor of laws, upon William J. Hale, president of Tennessee Agricultural and Industrial College, Nashville, Tenn., and Walter White, executive secretary of the National Association for the Advancement of Colored People.

Total number of Howard University graduates.—The total number of graduates of Howard University is now 10,537. Of this number the registrar has over 6,000 correct addresses in 41 States, the District of Columbia, and 16 foreign countries, classified alphabetically by States, cities, sex, schools, and classes.

Summary of Students Graduated by Howard University for the Years 1938-39 and 1937-38

Division of the university *	Graduates					
	1938-39			1937-38		
	Men	Women	Total	Men	Women	Total
THE COLLEGES						
College of liberal arts	59	92	151	54	82	136
School and engineering and architecture	3	1	4	4	1	5
School of music	3	1	4	3	3	6
Graduate school	20	22	42	21	24	45
Total	85	115	200	82	109	191
PROFESSIONAL SCHOOLS						
School of religion	5	1	6	6	1	7
School of law	22	1	23	14	1	15
School of medicine:						
College of medicine	28	2	30	22	1	23
College of dentistry:						
4-year course	7	1	8	7	1	8
Dental hygiene		6	6		6	6
College of pharmacy		1	1	3	1	4
Total	62	9	71	52	7	59
Grand total	147	124	271	134	116	250

THE TEACHING STAFF

Number and full-time status of teachers.—There were 244 members of the teaching staff for 1938-39, of whom 153 were full-time teachers and 91 were rendering part-time service, representing together a full-time equivalent of 171.27 teachers.

In 1928 when the trustees began to put the 10-year program into operation, there were 161 teachers in the university, 81 of them being on full-time service and 80 on part-time service. During the intervening period the total number of full-time teachers has been increased by 88 percent. This means, in brief, a major improvement in the life of the university that has greatly strengthened the quality of all divisions of instruction in all schools and colleges. The teaching load in the college of liberal arts, for example, has been reduced by one-half. Ninety percent of the work of instruction in the university is now being done by teachers who are devoting their full time to education.

There are three major divisions in the university in which the inadequacy of teaching personnel is more pronounced. These are (1) the graduate school, including related work in the college; (2) the clinical branches of medicine; and (3) the school of religion. Improvement in the latter must be provided for wholly out of private resources.

Salary scale and advancements in rank and salary.—A definite salary scale has been adopted in each rank of instruction. The minimum has been reached and passed in each rank, but the university is short of agreed upon averages in each rank by the following sums: Instructors, \$209; assistant professors, \$142; associate professors, \$83; professors, \$865.

Definite and objective criteria have been established for advancements in rank and salary, but limited funds have made the pace of advance very slow, and the rank of professor has suffered.

The maturity of the staff.—On the basis of the 10-year program the present staff of Howard University should have the following distribution: Professors (40 percent) 66, associate professors (10 percent) 16, assistant professors (20 percent) 33, instructors (30 percent) 49. In 1938-39 the actual staff, on full-time and full-time equivalent basis was: Professors (21.6) 37, associate professors (13.5) 23, assistant professors (26.3) 45, instructors and assistants (38.6) 66. This situation represents substantial progress; but, as will be seen, approximately 65 percent of the staff is in the two lower ranks, as compared with the 10-year objective of 50 percent, and only 21.6 percent are in the professorial rank, as compared with the 10-year objective of 40 percent. The university is but slightly beyond the halfway mark in the number of mature professors. Twenty-nine such men and women are now needed.

Tenure regulations and retirement system.—Regulations governing tenure have been adopted and revised by the trustees after consultation with faculty representatives. Further revision designed to increase security, is experimentally under way. A retirement system has been adopted, providing an annuity of from one-third to one-half average annual income on payment of premium of 5 percent of the salary by teacher matched by similar payment of 5 percent by the university.

Educational assistants, educational and scientific supplies and equipment.—Teaching resources in these items have been trebled during the progress of the 10-year program, but the university is still operating 34.2 percent below the objectives in these fields.

Faculty publications.—One of our professors in the college of liberal arts has made a careful study of the scholarly productions of that faculty over a period of years (through 1937-38), showing in brief that they have published 56 books and monographs, 469 articles and papers, 141 book reviews, and 86 other creative contributions such as poetry, plays, paintings, etc. This is a highly favorable picture. In the discussion of this result, however, the writer makes the following significant comment: "It should be kept in mind

that it has only been within the last 10 years that the teaching load in the college has been sufficiently reasonable to allow time and energy for scholarly productivity."

Publications of the university faculty during the year 1938-39 were as follows: eight books, 104 scientific and scholarly articles, and 21 book reviews. In addition there were nine other creative contributions which included seven creations from the art department, publication of a musical composition by a member of the faculty of the school of music and an invention patented by a member of the faculty of the school of engineering and architecture. All schools and colleges of the university were represented in these publications and contributions.

As indicated under "General trends," many of these publications have had and continue to have highly constructive bearing upon the practical life of the people.

THE GRADUATE SCHOOL

General trends.—The graduate school continued the unbroken trend of increased enrollment which it has maintained since 1929-30, throughout all the years of the depression. The steady increase in graduate enrollment has been of a national character. This year the students came from nearly three-fourths of the States of the Union. While students have come predominantly from colleges and universities established for Negro youth they have increasingly come also from many of the long-established colleges and universities in the North and West.

Two major developments designed to have a very helpful effect upon graduate work appeared during the year. The new library building has been dedicated and placed in service. Its provisions for graduate reading rooms, seminar rooms, and cubicles for individual study in the stacks have greatly facilitated graduate study. The new men's dormitory, now under construction and to be available during 1939-40, is so arranged as to permit an entire section to be set apart for graduate students.

Enrollment.—The total enrollment of graduate students for the year 1938-39 was 407. This represents an increase of 81 students over the enrollment of 326 students in 1937-38. Two hundred sixty-four of these students were registered in the first semester, 242 in the second semester, and 120 in the summer school. One hundred and sixty-four of the total were men and 243 were women.

There were 118 full-time students in the first semester and 115 full-time students in the second semester of 1937-38. (The full-time student load is rated at 5 subjects or 15 semester hours.) In

1938-39 there were 154 full-time students in the first semester and 135 in the second semester. This shows an average increase of 28 in the number of full-time students.

Sources of students.—The 407 graduate students came from 33 States, including the District of Columbia, and three foreign countries. The largest number of students from a single place came from the District of Columbia, which furnished 122 students. Forty-two came from Virginia, 28 from North Carolina, 27 from South Carolina, 19 from Maryland, 15 each from Alabama and Georgia, 13 from Pennsylvania, 12 from Texas, and 11 from Tennessee. Sixteen Southern States and the District of Columbia, in which separate schools are mandatory, furnished 340 graduate students or 83 percent of the total enrollment. These students received their first degrees from 72 colleges and universities before coming to Howard University. Thirty-one students held degrees from colleges of the North and West attended by students of both races. Among the total of 407 there were 35 who held master's degrees prior to registration at Howard.

Departments of instruction and faculty.—The 407 students for the year 1938-39 did their work in 19 departments of instruction. One hundred and eighty-seven or 46 percent of the students in the graduate school did their work in education, psychology, and philosophy. Ninety-five or 23 percent did their work in the social sciences of economics, sociology, social work, history, and political science. Forty-eight or 12 percent did their work in the natural sciences, in mathematics, botany, zoology, chemistry, and physics. Fifty-five or 14 percent did their work in English, German, and romance languages.

The general trend of specialization indicated above has been followed by the students over a period of 4 years, the comparable figures for the 4-year period 1934-35 to 1938-39 being as follows: Total graduate students, 1,485; specializing in education, psychology, and philosophy, 654 or 45 percent; specializing in the social sciences, 356 or 24 percent; specializing in mathematics and the natural sciences, 202 or 14 percent; specializing in languages and literature, 240 or 16 percent.

Eighty-one teachers offered graduate courses of instruction during 1938-39 as compared with 72 teachers in 1937-38.

Social work.—Graduate instruction in social work was undertaken for the first time in the academic year 1935-36, under the direction of the Department of Sociology. Steps are now being taken to improve the work so as to qualify for national accreditation. Specific projects for 1939-40 include a field-work supervisor, field-work super-

vision in the Family Service Association, instruction in medical social work, and additional instruction in public assistance and psychiatric work.

Degrees conferred.—At commencement 42 graduate degrees were conferred on 19 men and 23 women. Thirty-three received the degree of master of arts and 9 the degree of master of science.

The future of graduate work.—The rapid development and accreditation of public schools and colleges for Negroes in the States of their majority residence within the last 10 years have created an acute and growing need for mature teachers with thoroughly competent training on the graduate level. The soundness of the educational structure throughout these States depends primarily upon the caliber of graduate instruction which is made available to meet this situation.

There is yet nowhere among these States a single tax-supported college of liberal arts with a sufficient number of departments of instruction and a sufficient amount of resources for personnel, educational supplies, and equipment to undergird and maintain the establishment of a first-rate graduate school.

Howard University is still the most promising center for graduate work for Negroes. The steady increase in the enrollment in the graduate school from 43 in 1926-27 to 407 in 1938-39 is an index both of the rapidity with which the need has developed and of the remarkable opportunity which now confronts Howard University in this field. It is of the utmost importance to the States of the Negroes' majority residence and to the Nation that all possible steps now be taken to place the graduate work at Howard University on a sound and thoroughly competent basis.

In such a program certain immediate steps are necessary: (1) the book collection of the university should be doubled within a period of 5 years; (2) special scholarships and fellowships for graduate students should be provided; (3) funds should be available for at least that minimum of research which is necessary to maintain a living mind in the members of the staff who teach graduate students; (4) salaries of mature teachers on the staff of the university should be so increased as to enable them to give their entire time to their work without worry; (5) the number of such mature, well-paid teachers should be increased as rapidly as possible.

THE COLLEGE OF LIBERAL ARTS

General trends.—The caliber of entering students was the best in the history of the college of liberal arts for more than a decade. The enrollment and the graduating class of 1939 were the largest

since the college was reorganized in 1933-34. An evaluation of the new plan of study indicates that the college is well on its way toward providing a greatly improved type of general education for its students. The faculty continued to show improvement in competence and in scholarly activity.

Enrollment.—The college of liberal arts enrolled 1,383 students in 1938-39. This is the largest enrollment in the history of the college. It represents an increase of 51 over the enrollment of 1937-38, and an increase of 227 over the enrollment of 1934-35, which was the first year of the merger of the college of education with the college of liberal arts. Twelve hundred sixty-nine of these students were registered in the two semesters of the regular school year and 144 in the summer school.

Graduates.—There were 151 graduates of the college of liberal arts for 1938-39 as compared with 136 in the previous year. This is the largest graduating class since the college was reorganized in 1934-35.

The faculty.—There were 86 members of the faculty of the college officially in service during the academic year 1938-39. Of these, 80 were full-time teachers and 6 were part-time teachers. Twenty-three of these were full professors, 13 were associate professors, 22 were assistant professors, 26 were instructors, and 2 were assistants.

The following significant factors about the faculty of liberal arts are taken from a study made during 1937-38 and brought up to date by Dr. Charles H. Thompson, dean of the college of liberal arts:

1. Of the 23 full professors, 17, or 73.91 percent, have the doctorate degrees, and no full professor possesses less than 2 years of graduate training.
2. Of the 13 associate professors, 8, or 61.5 percent, have the doctorate degree; 4, or 30.77 percent, have 2 or more years of graduate training, and only 1 (an art teacher) has less than 2 years of graduate training.
3. Of the 23 assistant professors, 10, or 43.48 percent, have doctorate degrees; 9, or 39.13 percent, have 2 or more years of graduate training. Only 1 of the 23 has less than 1 year of graduate training, and this person is a personnel officer (dean of men), who gives part-time instruction in the college.
4. Of the 24 instructors, 23, or 95.82 percent, have 1 or more years of graduate training. The 1 exception is an instructor in art who possesses a special art diploma from the School of the Museum of Fine Arts, Boston, and 1 from the Designers' Art School, Boston. This instructor was on leave of absence for study in Paris in the year 1937-38.
5. Taking the faculty as a whole, 45.78 percent have doctorate degrees or more; 75.9 percent have 2 or more years of graduate training; and the only persons (3) who do not have some formal graduate training are the special cases already noted.

Faculty publications during the year 1938-39 included 6 books, 62 articles published in scholarly periodicals, 20 book reviews, and 7 creative contributions in art.

The curriculum.—The curriculum of the college of liberal arts has been developed under a new plan of study, including a program of general education for the first two years and of special education for the last two years. The new plan of study became operative for all entering freshmen after September 1937. The primary design of the new plan of study has been to improve the general education of the students and to prevent too early and too narrow specialization. The sophomores of the year just ended were the first class to enter under the new plan requirements. On the basis of general education tests which were given to these sophomores and to the seniors who entered under the old program where too early and too narrow specialization was possible and practiced, it was found that, after making an allowance for the knowledge gained through specialization by the seniors, the sophomores did consistently better on all tests. The new plan of study, however, is still undergoing critical evaluation and revision. Three new general divisional courses will be required of all students during the first year—"Introduction to the Social Sciences," "Introduction to the Humanities," and "Introduction to Physical and Biological Sciences." The course in freshman orientation and guidance has been eliminated.

MILITARY SCIENCE AND TACTICS

Enrollment.—The enrollment in the department of military science and tactics for the year 1938-39 was 328 for the first semester and 301 for the second semester as compared with 329 for the first semester and 323 for the second semester of last year.

Unit rated as "Excellent."—Maj. Harry M. Gwynn inspected the R. O. T. C. unit from May 22 to May 25, and attended R. O. T. C. day on June 2, 1939. A summary of his report is as follows:

"General rating of the unit—'Excellent.'"

Credits allowed.—Last year the faculty of the college of liberal arts voted to give academic credit for the advanced courses in military science and tactics to the extent of 1½ semester hours per semester; and this year the faculty voted that the basic courses shall yield 1 semester hour's credit for each of the four semesters in which the work is given.

Commissions awarded.—Nine students were awarded commissions as Second Lieutenants, Officers' Reserve Corps, United States Army, contingent upon their completion of a period of training in camp this summer.

SCHOOL OF ENGINEERING AND ARCHITECTURE

General trends.—Howard University is the only institution for Negro youth in the United States which now has accredited work in engineering. Although properly qualified students may enter the freshman class of the school of engineering and architecture upon graduation from high school, there is a pronounced growth in the number of students registering for degrees in this school who have studied previously in other institutions of higher learning. Ten percent of the students registered in 1938-39 had already earned a bachelor's degree. Seventy percent of the student body came from States in which dual systems of education prevail.

Enrollment.—The year 1938-39 witnessed the largest enrollment in the 28 years which have passed since the establishment of this school. Sixty students from 16 States and 1 foreign country registered for degrees in civil, electrical, and mechanical engineering, and architecture. This is an increase of 10 students, or 20 percent over the total enrollment of the preceding year.

Graduates and their employment.—Three students were graduated at the June commencement, 1939, one each in architecture, civil engineering and electrical engineering. All received employment within the week following graduation. Howard now has 72 graduates in the engineering and architectural fields distributed as follows: Architecture, 13; civil engineering, 7; electrical engineering, 27; and mechanical engineering, 25. All these graduates are employed and working in 18 States, the District of Columbia, and 4 foreign countries. During the current year a graduate of our school was appointed one of three associate architects of the low-rent Federal housing project at Charleston, W. Va.; one was appointed junior engineer, Public Works Administration, Fort Wayne, Ind.; and another was appointed to the National Park Service, Schnecksville, Pa.

Faculty.—The regular faculty of 8 full-time members serving in the first semester included 1 professor, 2 associate professors, 3 assistant professors, and 2 instructors. During the second semester the active faculty consisted of 9 members distributed in rank as follows: 1 professor, 1 associate professor, 3 assistant professors, and 4 instructors. Two members of the faculty were on leave of absence.

Five members of the faculty are registered professional engineers by examination in the States of Alabama, Ohio, Pennsylvania, Virginia, and the District of Columbia.

There were two publications by faculty members during the year and one member of the faculty obtained a United States patent on his invention, "An Optical Apparatus for Determining the Position of a

Tool." This invention makes possible the creation of an object in metal, directly from a drawing of the object.

SCHOOL OF MUSIC

Number and distribution of students.—There were 216 students enrolled in the school of music for the year 1938–39 as compared with 222 students for the year 1937–38. Ninety-two of these students were registered in the regular courses leading to a degree; 124 students were classified as special students, the majority of whom were registered in the junior department.

Faculty.—The faculty comprised 15 members during the year. Eleven were full-time teachers and 4 were part-time. One member of the faculty was on leave of absence for 1938–39. He was star of the musical drama, "The Sun Never Sets." He appeared as guest artist with leading English orchestras and will appear as guest artist with the philharmonic orchestra at the Lewisohn Stadium in New York City this summer. A member of the faculty played a series of piano recitals in several Southern States. One member of the faculty has been granted sabbatical leave to continue research in the field of Creole music. A song recently published by a member of the faculty has been sung during the year by several distinguished artists. Original music by different students has been selected for public programs by recital artists.

Graduates.—Four students were graduates at the June commencement, 1939. Three received the degree of bachelor of music; 1 received the degree of bachelor of school music.

Outstanding events of the year.—The recital of Marian Anderson, world-renowned contralto, attracted both national and international attention. Seeing the inability of the university to secure an auditorium of sufficient size on account of racial barriers and discrimination, the Secretary of the Interior granted permission for an open-air recital on the steps of the Lincoln Memorial. The program was sponsored by eminent persons from all walks of the Nation's life and was broadcast on a national network with an estimated attendance of 75,000 persons. A complete recording of this event, which includes the description by the radio announcer, an introductory address by the Honorable Harold L. Ickes, Secretary of the Interior, and the recital of Miss Anderson, will be available at Howard University for all future generations of its students.

The concert series this year was very successful. The committee presented Egon Petri, pianist; Conrad Bernier, organist; Catherine Van Buren, soprano; the Russian Trio; Charlotte Wallace Murray, contralto; and Muriel Kerr, pianist.

On May 20, 1939, the school of music produced and presented Verdi's opera, *Il Trovatore*. This was the first attempt of the school of music to give its students an insight into the production of opera. Many departments of the university were called into action. Two hundred members of the student body and faculty were in the cast and on the staff. Opportunity was given to the students of voice to create the leading roles. Students of instruments were given first-hand opportunity to follow an operatic score. The stirring choruses were sung by members of the men's glee club and the women's glee club of the university and other Howard students, representing many departments of the university. A capacity audience attended both the matinee and evening performances of the opera and the press comment was highly favorable.

SCHOOL OF MEDICINE

The school of medicine is the functional organization which represents the cooperative interests of the entire medical unit of the university without superseding the direct line of relationship between the independent faculties and the board of trustees. The autonomous member units are the college of medicine, the college of dentistry, and the college of pharmacy. Freedmen's Hospital, an independent institution built upon grounds owned by the university, is functionally a part of the university medical unit.

COLLEGE OF MEDICINE

Outstanding events of the year.—(1) Under sponsorship of the National Tuberculosis Association and the District of Columbia Tuberculosis Association, the first Annual Conference of Negro Tuberculosis Workers was held at the College of Medicine on June 5, 6, and 7, 1939. Twenty-four Negro specialists on tuberculosis from various parts of the country registered for the conference. Speakers at the conference included some of the most eminent authorities and specialists on tuberculosis in the United States. (2) The Public Works Administration has granted \$600,000 for the erection of a 150-bed tuberculosis annex at Freedmen's Hospital. This should make available to Howard students facilities for clinical training in tuberculosis. With this clinical asset, Howard University and Freedmen's Hospital should become an important national center of interest and activity with respect to the control of tuberculosis. (3) The postgraduate course in venereal-disease control, introduced last year, was continued through a grant of \$13,500 made by the United States Public Health Service. Twenty-one Negro physicians, drawn

principally from the Southern States, registered for this course. (4) Continuance of the study of student health programs in Negro colleges was made possible by a grant of \$600 from the National Tuberculosis Association and a grant of \$600 from the American Social Hygiene Society. (5) A resurvey of the school was made by the Council on Medical Education of the American Medical Association on April 12 and 13, 1939. This survey placed special emphasis upon the relationship of the school to the hospital. A report on this survey has not yet been made. (6) Considerable improvement has been made in the general appearance in the wards of the Freedmen's Hospital and its physical facilities. New physical X-ray equipment has been installed and an additional X-ray technician has been employed. Other valuable equipment and facilities have been provided.

Students.—Of a total of 282 applicants, 240 presented minimum premedical requirements for admission. From this number 39 freshmen were admitted. The largest number of medical students registered at any time during the year was 137.

Graduates.—The degree of doctor of medicine was conferred upon 30 graduates at the June commencement all of whom have secured internships in hospitals approved by the Council on Medical Education and Hospitals of the American Medical Association.

Thirty-four Howard University graduates were examined by 12 State boards in the United States during the year; 33 passed and 1 failed. The percentage of failures was 2.9 percent as compared with 8.5 percent for 1937. The failure rate of 2.9 percent is the lowest recorded in the history of the college of medicine.

Faculty.—Of a total of 96 faculty members who devoted time to teaching, 28 were full-time teachers and 68 were part-time teachers. The great majority of the part-time teachers were clinical instructors and clinical assistants.

One General Education Board fellow will continue the study of surgery at Columbia University College of Physicians and Surgeons for another year; another who spent the past year in the study of neuropsychiatry at the University of Iowa, will spend the year 1939-40 at Harvard University; one General Education Board fellow in internal medicine will report for study on July 1, 1939, at the University of Rochester, while another will report on July 1, 1939, at the University of Michigan for study of thoracic surgery.

The 16 publications of the faculty during the year 1938-39 consisted of 1 book, 1 book review, and 14 articles. In addition there were 2 abstracts and 8 articles were accepted by various journals for publication during the year 1939-40.

COLLEGE OF DENTISTRY

General trends.—There was an increase in the enrollment in 1938–39, continuing the regular increase in numbers for the past 5 years. Incoming students showed marked increase in educational background and professional promise.

Over 50 percent of the full-time teachers of the college of dentistry have engaged in formal research and graduate studies, and most of this group have received the degree of master of science for work in their special fields.

Further improvements were made on the present physical plant, which greatly increase its usefulness for temporary purposes. Its limitations, even under these improved circumstances, however, indicate the pressing need for a new dental building and equipment.

Students.—Fifty-one students enrolled in the college of dentistry in the year 1938–39. Eighteen of these were dental freshmen and six were young women registered in oral hygiene. The total enrollment showed a gain of three students over last year's enrollment, while the freshman class showed a gain of seven students over the preceding year.

Of the 18 freshmen, 13 held bachelor's degrees; 2 had completed 3 years of college work and only 3 had the minimum requirements for admission of 60 semester hours or 2 years of college work. The freshman students came from 9 States, the District of Columbia, and the British West Indies, and their predental instruction was pursued in 10 colleges and universities. The average amount of clinical work accomplished per student during 1938–39 excelled that of any previous year of clinical records. The average income per student in 1929–30 was \$156.56; since that time there has been a gradual rise until the current year when the income reached the rate of \$405.59 per student.

Graduates.—Seven graduates received the degree of doctor of dental surgery, and six received certificates in oral hygiene.

Of the graduates in dentistry two received postgraduate internships paying \$1,500 for the year 1939–40 at the Murry and Leonie Guggenheim Dental Clinic in New York; another received a similar appointment at the Forsyth Dental Infirmary in Boston, Mass.; two others received internships at the Freedmen's Hospital, Washington, D. C., and the Harlem Hospital, New York.

Faculty.—There were 15 members of the faculty during the year, distributed by rank as follows: One professor, 2 associate professors; 6 assistant professors; 4 instructors; 1 academic assistant; and 1 clinical assistant. Two of the instructors were part-time, and the

2 assistants were part-time teachers. Prior to 1935 only 1 faculty member had engaged in graduate study in dentistry. At the present time 6 members hold the degree of master of science. Two others have done graduate work leading to the degree. Fifty-eight percent of the full-time teachers have completed at least 1 year of graduate work. The faculty continued its program of public education and guidance during the year, visiting 27 colleges and universities in 14 States, and the District of Columbia, and conferring with students interested in dentistry.

COLLEGE OF PHARMACY

General trends.—During the last 10 years there has been a steady decline in the number of students entering pharmacy in all institutions. As a result, an acute shortage of pharmacists has been created in all sections of the country. During the year 1938-39, the college of pharmacy received requests from 30 drug stores to supply them with pharmacists. The prevailing tendency among pharmacists is toward the professional type of store rather than the general drug store. Pharmaceutical manufacturers are beginning to employ Negro pharmacists as detail and professional representatives.

Enrollment.—During the year 1938-39 the college had an enrollment of 31 students as compared with 28 students for the year 1937-38. These students came from 13 states, the District of Columbia and 2 foreign countries. Scholastic attainments of the entire group of students for the year 1938-39 were considerably above those of students in previous years.

Graduates and their employment.—The college had one graduate to receive the degree of bachelor of science in pharmacy at commencement in June 1939. Of the three graduates of the class of 1938, one has successfully passed the Ohio State board, the other two have passed the Pennsylvania State board. All of the graduates for the past 4 years are employed in pharmacies.

Faculty.—The faculty for the year consisted of one full-time professor of pharmacognosy, three full-time instructors in pharmacy, and one part-time instructor.

All members of the faculty are duly licensed and registered to practice pharmacy and are active members of the major pharmaceutical organizations. Two articles were published by a member of the faculty during the year.

Supplies to various departments.—The college supplied to the university health service 1,944 units of material in labeled containers ready for dispensing and clinical use. This was more than twice the amount supplied during the previous year. In addition, the college

filled 193 prescriptions for students of the university written by the staff of the health service as compared with 112 prescriptions for the year 1937-38, which represents an increase of 81 prescriptions or 72 percent. Pharmaceutical preparations and supplies were also furnished to the colleges of dentistry and medicine and the department of physical education.

SCHOOL OF LAW

General trends.—The school of law at Howard University is the only school freely admitting Negroes which maintains sufficiently high legal standards to be a member of the American Association of Law Schools and on the approved list of the American Bar Association.

In addition to its work of sound instruction in all elements of basic law, the school of law at Howard University continues to place emphasis on all phases of law which peculiarly affect Negroes and to train Negro students to cope with those socio-legal and economic-legal problems which specifically affect Negroes. As a matter of legal theory, the rights and duties of Negroes do not vary from those of other citizens. Actually, in the courts and in other places where legal problems are raised, a difference does exist. It is essential, therefore, that the education and training of Negro lawyers should qualify them to cope with the problems of this group.

Students.—There were 71 students enrolled in the school of law for the year 1938-39, which is 5 less than the number of students enrolled in the year 1937-38, but almost double the enrollment of 1933-34, when there were only 37 students.

Twenty-seven States and 34 colleges and universities are represented in this year's student body. Twenty-six of these colleges are Negro institutions and 24 of them are located in the South.

Of the total number of students, 49 possessed a bachelor's degree and 17 others completed more than the minimum admission requirement of 2 years of college work.

Graduates.—Twenty-two law-school students received the degree of bachelor of laws in 1938-39 as compared with 16 in 1937-38 and 17 in 1936-37. This was the largest graduating class since the school of law was established as a full-time day law school 11 years ago. During the year graduates of the law school were admitted to practice law in the District of Columbia, Florida, Illinois, Kentucky, and Virginia.

Faculty.—The faculty for the year 1938-39 consisted of eight members, distributed by rank as follows: One professor, one associate professor, five assistant professors, and one lecturer. Of these, five were full-time teachers and three were part-time, the part-time serv-

ices being equivalent to one-half the services of a full-time teacher.

Thirteen articles were published by members of the faculty during the year, and one paper was read before the section on public utilities at the annual meeting of the National Lawyers Guild. Two members of the faculty successfully argued two cases dealing with the civil rights of Negroes before the Supreme Court of the United States.

William H. Hastie, judge of the United States District Court of the Virgin Islands, was named dean of the school of law, effective July 1, 1939.

The library.—The law library contains 20,436 bound volumes, and ranks second in size among the law-school libraries of the District of Columbia. The additions for the year 1938-39 include 393 volumes received on purchase, 33 volumes received as gifts, 45 volumes as bound periodicals, 46 periodical titles received on purchase, and 24 periodical titles received as gifts. The total circulation of books for 1938-39 was 5,022 as compared with a circulation of 4,810 for 1937-38.

SCHOOL OF RELIGION

Financial support.—The school of religion receives no aid from Government funds. Its work is maintained entirely by endowment and private gifts.

General trends.—For 7 years the school of religion has permitted only college graduates to be enrolled. In 1932-33 there were only 5 graduate students in the school of religion while there were 39 in 1938-39.

The school of religion takes the lead in graduate seminary work for Negroes. Its enrollment of Negro college graduates exceeds that of any seminary in the United States.

Students.—There were 40 students enrolled in the school of religion in the first semester and 43 in the second semester of the year 1938-39. The total net enrollment of 43 is an increase of 11 students over the enrollment of 32 students in 1937-38. Thirty-one colleges supplied the undergraduate training of this year's student body.

The school has been interdominational from its very beginning. The 10 denominations represented by the students this year include the Colored Methodist Episcopal, the African Methodist Episcopal Zion, the Congregational, the Presbyterian, the Baptist, the Church of God, the Christian, the Syrian Christian, the Methodist Episcopal, and the African Methodist Episcopal churches.

Graduates.—Of the nine students graduated from the school of religion at the June commencement, 1939, five received the degree

of bachelor of divinity and four received the master's degree in religious education. Three of the four students who received the master's degree had already received the degree of bachelor of divinity. It should be noted that the master's degree in religious education is awarded by the graduate school under the supervision of which all graduate work in the university is consolidated under one head.

Faculty.—The faculty for 1938-39 consisted of four full-time teachers and six part-time teachers, representing a gain of one in the full-time staff, and a high-water mark of four in this important group. One member of the faculty was away on sabbatical leave. During the year members of the faculty published one book and seven articles.

New home.—The school of religion will move from its present quarters to the Carnegie Library Building, which is expected to be ready for occupancy some time during the year 1939-40. The Carnegie Building fully fits the requirements of the school of religion. It will provide library space for 40,000 volumes, 5 classrooms, ample reading and study space, 7 offices for the faculty, an ample chapel, a social room, and rest rooms.

Library.—There are approximately 3,000 volumes in the school of religion library. Thirty-three hundred volumes of religious books now housed in the general library will be moved to the Carnegie Building, making a total of 6,300 volumes.

THE LIBRARY

Outstanding events.—The general library of the university is now housed in its new home, the Founder's Library, which was opened for use on January 3, 1939. Certain important collections were acquired during the year. Of special note is the acquisition of the Richard Le Galliene Collection of 175 books, 23 letters, manuscripts, and magazine articles, assembled by the late Prof. Benjamin Brawley and made available to the university as a gift. To the collection on Negro life and history two special types of significant material were added. Important issues of *The Liberator* were purchased. A significant gift of other issues came from Dr. Oswald Garrison Villard, who also added other valuable antislavery material. A very promising beginning was made in collecting manuscripts, printed compositions, pictures, and letters of Negro musicians. The work on the catalog of books by and about Negroes in the Moorland Foundation was completed. This bound, mimeographed publication of more than 500 pages was made possible by funds for personnel received from the Works Progress Administration.

The Moorland Foundation supplied about 3,129 readers with approximately 4,905 cataloged books, pamphlets, and periodicals, more than 200 newspaper clippings, and over 40 pictures—an approximate increase of 82.5% in the items used by patrons. The collection now totals 11,300 items, comprising 6,626 books, 3,981 pamphlets, 416 bound periodical volumes and 277 Howard masters theses.

The Union Catalog of items by and about Negroes, found in and about 10 different libraries, made available through Works Progress Administration funds, contains about 30,000 cards, providing a clearing house for over 100,000 publications.

Statistics.—The total number of books now accessioned in the university libraries is 119,146. This is an increase of 7,345 over the 111,801 books accessioned in 1937–38. Seven thousand three hundred and forty-five books were accessioned in all university libraries during 1938–39 as compared with 5,441 in 1937–38. Eight hundred and twenty-three periodical titles were received by all libraries, 579 of which were received by the main library. The circulation recorded in all libraries for 1938–39 was 157,110. This is an increase of 20,629 over the total circulation for 1937–38. The circulation recorded in the main library was 94,319 as compared with 74,587 for the previous year.

BUILDINGS AND GROUNDS

Buildings under construction.—The following table shows the list of building projects in progress during the year ended June 30, 1939. These buildings were going forward under the funds and direction of the Federal Emergency Administration of Public Works.

Building Projects in Process, Year Ended June 30, 1939

No.	Description of project	Date authorized	Total appropriations
5	Construction and equipment of a library building.....	Feb. 14, 1931	\$1, 105, 000
9	Construction and equipment of dormitories for men.....	Oct. 4, 1935	646, 200

The status of the above-listed projects, as of June 30, 1939, was as follows:

Project No. 5.—Construction and equipment of a library building. The Founders Library was completed, and on May 25, 1939, it was dedicated and presented to the university by the Honorable the Secretary of the Interior, Harold L. Ickes.

Project No. 9.—Construction and equipment of dormitories for men. This building project was 76 percent complete on June 30, 1939. It is expected to be ready for occupancy on December 3, 1939.

Works Progress Administration projects.—Two Works Progress Administration projects were under way on the campus during the year—one in landscaping and the other in exterior painting. The first project included the extensive planting of trees, shrubbery, and grass, the resurfacing of tennis courts, and the construction of permanent bituminous walks in the area between Carnegie Hall and Miner Hall. In the second project was included the exterior painting of the women's dormitories and all of the buildings on the main campus with the exception of Carnegie and Thirkield Halls.

FINANCES

Assets.—The total assets of the university on June 30, 1939, were \$9,527,896.44, exclusive of the unexpended balances of Government appropriations for the men's dormitories. Of the total assets, the sum of \$1,106,873.93 represents assets in the physical plant extension fund, made possible through private gifts of the General Education Board and the Julius Rosenwald Fund, and through rentals of the property purchased by the gifts of these funds; \$979,098.21 represents endowment (this shows a net decrease of \$52,303.25 in the funds due to depreciation of securities—there was an actual increase of endowment gifts by \$34,162.91); \$7,315,830.01 represents plant fund assets (an increase of \$507,992.19 since the report of June 30, 1938) exclusive of the unexpended balances of governmental appropriations for buildings, as indicated above; \$1,341.46 represents a small-loan fund for students in the school of medicine. The remaining \$124,752.83 represents assets of the current fund.

Income and expenditure.—The total income for the year 1938–39 was \$1,609,487.60 including current and capital funds. This represents a decrease of \$302,267.62 in the total income for 1937–38. Gross income for current purposes was \$1,147,860.03, representing an increase of \$23,577.03 over the income for current purposes for 1937–38. Of the total income for current purposes the Government contributed \$723,364.77 or \$23,540.01 more than the Government contributed for 1937–38. The income for current purposes from private sources in 1938–39 was practically the same as that for 1937–38, being \$424,495.26 in 1938–39 and \$424,458.24 in 1937–38.

The total expenditures for all purposes, current and capital, for the year 1938–39 was \$1,616,518.59, representing a decrease of \$294,999.07 in the expenditures for the year 1937–38. The total current expenditures for 1938–39 were \$1,154,891.02, representing an increase of \$30,845.58 over the expenditures for 1937–38.

Attention is respectfully directed to the fact that during the year 1938–39 there was an increase in the amount and percentage of money

spent for graduate instruction and research and for the general library; there was a reduction in the percentage of funds spent for physical plant operation and maintenance. These trends are soundly in the right direction.

The audit of funds.—The auditing of all the university's accounts has been done by certified public accountants. All moneys appropriated by the Congress and by the Federal Emergency Administration of Public Works were expended under the supervision of the Secretary of the Interior.

APPRECIATION

On behalf of the trustees, faculties, and students of Howard University, I wish to express to the Secretary of the Interior and through him to the Members of the Congress and to the President of the United States our appreciation for their thoughtful and constructive interest in Howard University, and to all the officers and employees of the Department of the Interior for their courtesy and helpfulness in handling the affairs of Howard University.

INDEX

A

	Page
Additions to National Park System.....	289
Alaska, Territory of.....	XIV, 345
Alaskan natives, health work.....	49-51
Alaska Railroad.....	346
Alaska Road Commission.....	347
Alaska, work of Geological Survey in.....	155-158
All-American Canal.....	201
Appropriations:	
Education.....	124
Geological Survey.....	184
Indian.....	28
Mines, Bureau of.....	260
National Park Service.....	307
Vocational Education.....	131
Arts and crafts, Indian.....	44

B

Bonneville Administration.....	VIII, 383
Board of Geographical Names.....	191
Boulder Canyon project.....	200

C

Cadastral Engineering Service.....	2
Cases, Division of Investigations.....	323
Central Valley project.....	199
Charters, Indian.....	25-27
Civilian Conservation Corps:	375
Division of Grazing, activities in.....	331
Educational activities in.....	131
Indian work.....	34
Colorado Big Thompson project.....	202
Columbia Institution for the Deaf.....	422
Concessionaires, national parks.....	299
Connally Act, law.....	370
Conservation:	
Branch of Geological Survey.....	174-181
Education in.....	131
Indian resources.....	34
On Indian lands.....	35
Of Indian forests.....	37
Mineral program for.....	235
Unified forest policy for.....	392
Water supply studies.....	175
Wildlife protection program.....	334
Cooperatives, Puerto Rico.....	356
Crop results, reclamation projects.....	213

D

Deaf, Columbia Institution for.....	422
-------------------------------------	-----

E

Education:	
Appropriations for.....	124
C. C. C. activities.....	131
Conservation.....	131
Office of.....	XVII, 89-139
Federal activities in.....	74
Forum demonstrations.....	78
Indian adult.....	52
Information Service.....	102
Land-grant colleges and universities.....	70

Education—Continued.	Page
Library work.....	73
Public-school enrollment.....	71
Radio broadcasting.....	81
Statistics.....	125-127
University cooperation.....	90
Vocational.....	107-127
Vocational, appropriations for.....	125-127
Electrification, Rural, Puerto Rico.....	367
Exhibits, Office of.....	374
Expenditures:	
Geological Survey.....	184
Mines, Bureau of.....	232-263

F

Field activities by States, Geological Survey.....	148-155
Fire prevention, national parks.....	272
Forests:	
Conservation on Indian lands.....	35
Director of, report of.....	XIV, 392
Fire statistics.....	272
Puerto Rico.....	351
Freedmen's Hospital.....	423

G

General Land Office.....	XIX, 1-22
Geographical Names, Board of.....	191
Geological Survey:.....	XX, 139-190
Alaska, work in.....	155-158
Chemistry and physics, work in.....	146-155
Conservation Branch, work of.....	174-181
Field activities by States.....	148-155
Geologic work, year's activities.....	148
Grand Coulee Dam.....	198
Grazing districts, enforcement in.....	329
Grazing, Division of:.....	X, 326-343
C. C. C. work in.....	331
Organization of.....	326
Grazing licenses, number of.....	328
Grazing districts, status of.....	327
Grazing, wildlife conservation in.....	334

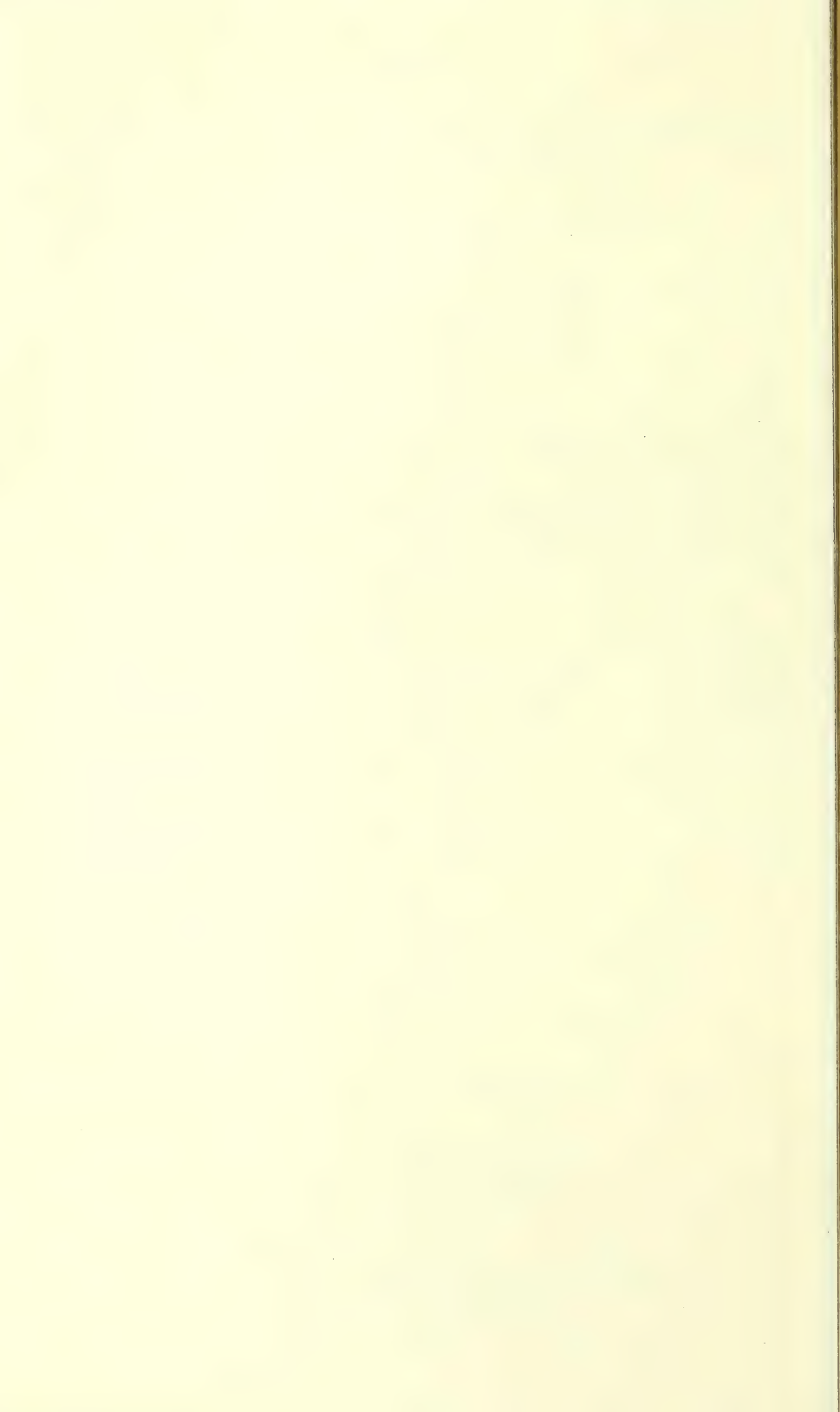
H

Health:	
Alaska natives.....	49-51
Indian.....	47
Indian tuberculosis.....	47
Helium.....	246
Helium, production of.....	246
Hospital, Freedmen's.....	423
Hospitals:	
Indian.....	47
St. Elizabeths.....	396
Housing:	
Indian.....	58
Howard University.....	430-456

I

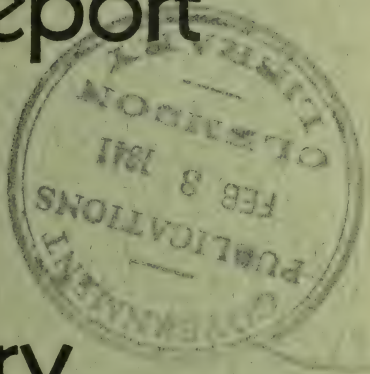
Ickes, Secretary's letter to the President.....	V-XXIII
Indians:	
Adult education.....	52
Affairs, Office of.....	XI, 23-68
Appropriations.....	28
Arts and Crafts.....	44

		Page		Page
Indians—Continued.			Puerto Rico Reconstruction Administration.	
C. C. C.	34		353-369	
Credit Fund.	28		Puerto Rico rehabilitation.	
Employment.	23		359	
Exhibits.	44		R	
Forests.	37-41		Radio, educational broadcasting.	
Future of the.	xii, 65		81	
Health.	46		Radio, information broadcasts.	
Income.	27		388	
Irrigation projects.	32-33		Reclamation:	
Population.	65-66		Bureau of.	
Self-government.	24		VI-VIII, 194-231	
Tribes.	66		Boulder Canyon project.	
Vocational education.	54		200	
Information, Division of.	388		Colorado Big Thompson project.	
Information Service, Office of Education.	102		202	
Investigations, Division of.	322-325		Construction program.	
Irrigation and crop results.	213		197	
L			Crop results on projects.	
Land grant colleges and universities, Federal			213	
activities in.		70	Financial status.	
M			206	
Maps, work of Geological Survey on.		158-164	Fund.	
Mine safety work, accomplishments in.		256	206	
Mineral leases and mining claims.		12	Grand Coulee Dam.	
Mineral withdrawals and restorations.		18-21	198	
Mines, Bureau of, report of.		xxi, 232-263	Indian projects.	
Mines, Bureau of, review of the year's work.		237	32-33	
Mines, Bureau of, future program.		235	Population on projects.	
Museum, Interior Department.		390	210	
N			Secondary investigations.	
Natchez Trace Parkway.		277	218	
National Capital parks.		288	Statistics.	
National Park Service:			Reconstruction Administration, Puerto Rico.	
Additions to system.		289	353	
Blue Ridge Parkway.		277	Recreational demonstration areas.	
Chesapeake and Ohio Canal.		265	296	
Concessionaires.		299	Rehabilitation, Indian.	
Federal buildings.		301	28-32	
Fire protection.		272	Rehabilitation, Rural, Puerto Rico.	
Historic sites and buildings.		269	359	
Olympic National Park.		293	Rights-of-way.	
Park attendance.		265	13	
Proposed monuments and parks.		293	Rum, Virgin Islands.	
Sugar pines.		266	349	
Negro Affairs, Office of Advisor on.		381	S	
O			Secondary investigations, reclamation.	
Olympic National Park.		293	218	
Oregon and California railroad grant lands.		4	Self-government, Indian.	
P			24	
Petroleum Conservation Division.		370	Social security, Indian.	
Population:			46	
Indian.		65-66	Solicitor, Office of.	
Reclamation projects.		210	313-321	
Proposed national monuments.		293	St. Elizabeths Hospital.	
Public lands, receipts from and expenditures			396-420	
on.		5	Statistics:	
Publications, Office of Education.		137-138	Education.	
Puerto Rico.		351	125-127	
			Geological Survey.	
			184-190	
			Indian Office.	
			66	
			Mines, Bureau of.	
			261	
			National Park Service.	
			305-312	
			Reclamation.	
			223-231	
			T	
			Territories and Island Possessions, Division	
			of.	
			344-352	
			Taylor Grazing Act receipts.	
			6	
			Taylor, Hon. E. T.	
			390	
			Travel Bureau.	
			269	
			Tuberculosis among Indians.	
			47	
			U	
			University, Howard.	
			430-456	
			Universities, Federal educational cooperation.	
			74	
			V	
			Virgin Islands, the.	
			347	
			Virgin Islands Co., the.	
			349	
			Vocational education:	
			107-127	
			Appropriations for.	
			125-127	
			Indians.	
			54	
			W	
			Water power, Geological Survey, studies on.	
			175	
			Water resources, studies of.	
			164-173	
			Wildlife, conservation.	
			334	



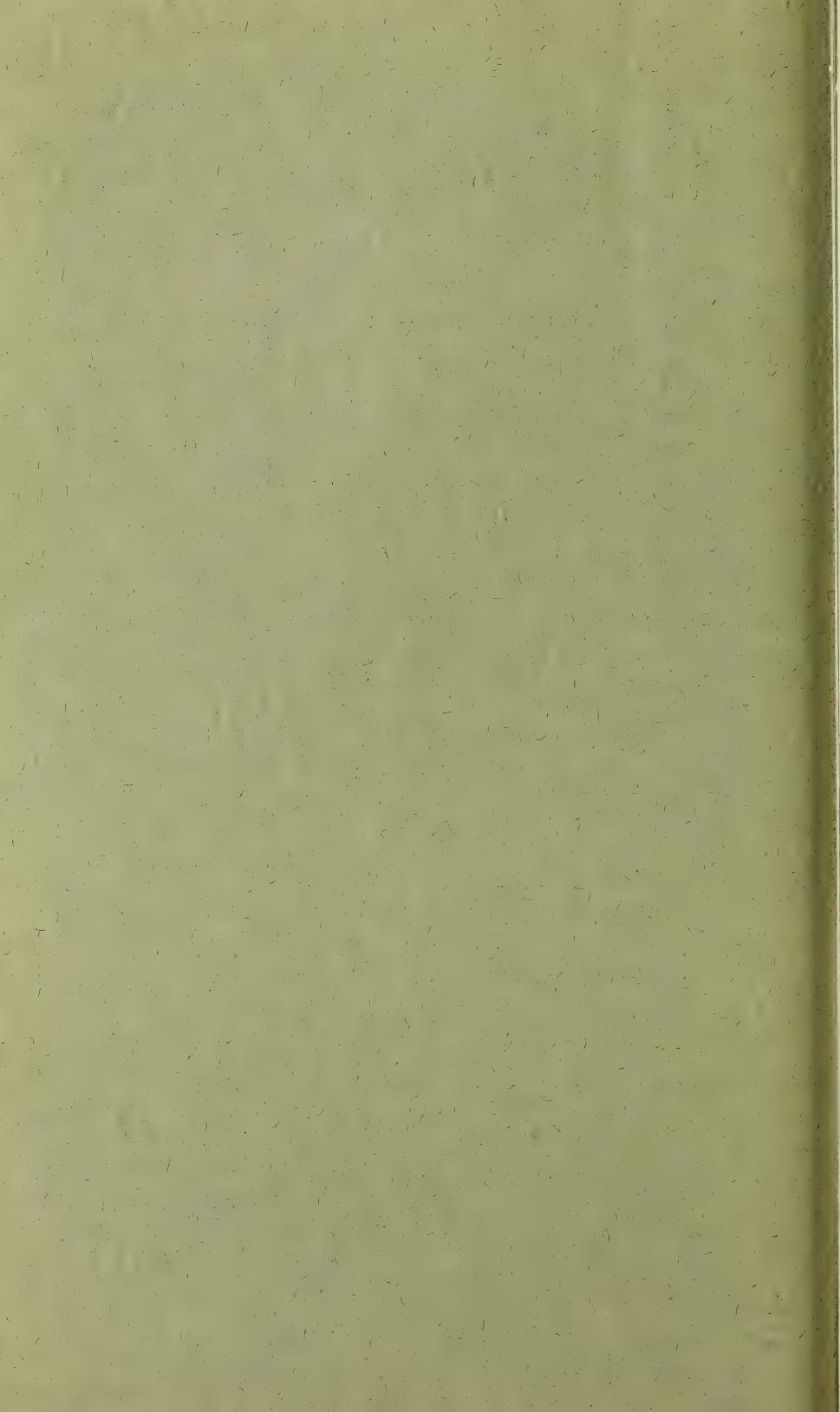


Annual Report of the Secretary of the Interior



FOR THE FISCAL YEAR ENDING JUNE 30

1940



**ANNUAL REPORT
OF THE
SECRETARY
OF THE INTERIOR**



FOR THE FISCAL YEAR ENDING JUNE 30

1940

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON · 1940

UNITED STATES DEPARTMENT OF THE INTERIOR

Harold L. Ickes, Secretary

•

For sale by the

Superintendent of Documents, Washington, D. C.

Price 75 cents (paper cover)

CONTENTS

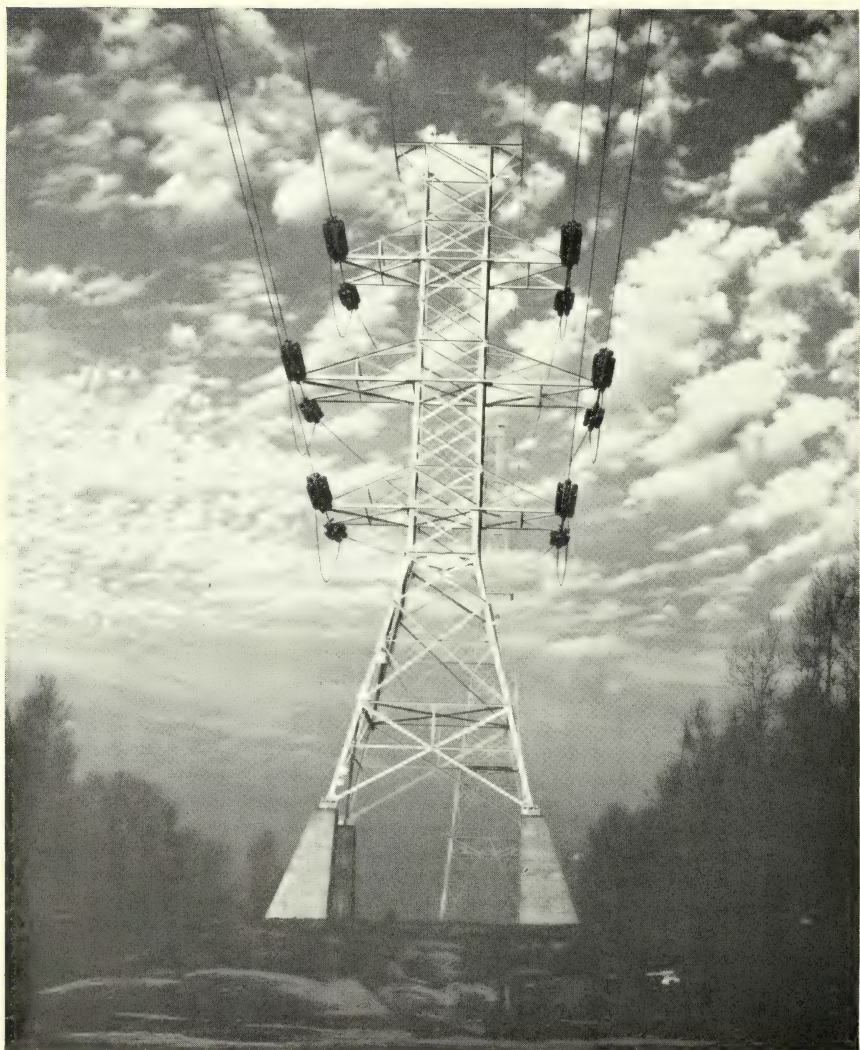
REPORT BY BUREAUS AND DIVISIONS

	Page.
Letter of Transmittal	v
Bureau of Mines	1
Geological Survey	39
Bureau of Reclamation	82
Bonneville Power Administration	127
General Land Office	134
National Park Service	162
Director of Forests	214
Petroleum Conservation Division	219
Bureau of Biological Survey	223
Bureau of Fisheries	291
Grazing Service	330
Office of Indian Affairs	354
Civilian Conservation Corps	401
Division of Territories and Island Possessions	408
Puerto Rico Reconstruction Administration	421
Division of Investigations	435
Office of the Solicitor	441
Bituminous Coal Division	451
Board on Geographical Names	469
War Minerals Relief Commission	471
Division of Information	474
Office of Exhibits	477
Interior Department Museum	479
St. Elizabeths Hospital	481
Columbia Institution for the Deaf	496
Freedmen's Hospital	499
Howard University	503

ILLUSTRATIONS

Frontispiece, power for the Northwest	facing page	v
Dig in for defense in mineral studies	facing page	xxxix
Rock-dusting promotes mine safety	facing page	1
Eyes that see through rocks	facing page	1
Geologists examine Rocky Mountain regions	facing page	39
Dredging for gold in Alaska	facing page	39

	Page
Grand Coulee Dam nears completion	facing page 82
Field of wheat on a Wyoming reclamation project	facing page 82
Final step in land measurement operations by General Land Office surveyors	facing page 134
View in the New Kings Canyon National Park, Calif.	facing page 162
Bird banding important step in conservation . .	facing page 223
One of America's majestic elk	facing page 223
Fur seal on St. Paul Island, Alaska	facing page 291
More fish for mountain streams	facing page 291
Cattle furnish food and footwear	facing page 330
Wool on the Federal range	facing page 330
Indian silversmith's art	facing page 353
Indian youths solve motor troubles	facing page 354
Girls aid in office work	facing page 354
Examination guards Indian health	facing page 378
Taos Indian ceremonial dance	facing page 379
Pueblo tribal council in session	facing page 379
View of harbor, St. Thomas, V. I	facing page 408
Curing vanilla beans in Puerto Rico	facing page 421
Raising chickens new venture	facing page 421



POWER FOR THE NORTHWEST.

Surging currents of electric energy speed over these wires from Bonneville and Grand Coulee generators under the program of the Bonneville Power Administration to provide for industrial expansion and national defense requirements in the Pacific Northwest.

LETTER OF TRANSMITTAL
THE SECRETARY OF THE INTERIOR
WASHINGTON

MY DEAR MR. PRESIDENT: The Department of the Interior wrote a memorable record in the 12 months ending June 30, 1940.

As is well known, the Department deals with problems of wide scope and great complexity. To mention but a few examples: The Department of the Interior markets electric energy from the Columbia River. It opens irrigated areas in the semiarid regions for settlement. It serves as guardian of the Indians and protects their property. It locates and analyzes useful deposits of strategic and critical minerals. It cooperates with States in the conservation of petroleum and natural gas. It watches over our fish and wildlife. It develops better methods for the production and utilization of minerals and metals. It helps to improve technical processes in mining. It manages great forests and controls the public domain. It aids in the stabilization of the economy of Hawaii, Alaska, Puerto Rico, and the Virgin Islands; it has specified duties with respect to the Philippine Islands. It rebuilds and regulates the livestock ranges of the West. It preserves historic buildings and recreational lands in national parks. It fixes the minimum prices for bituminous coal. It conserves the Nation's water resources above ground and below the surface.

Through all of these activities runs a central thread—the conservation of our natural resources. The efforts of the Department are directed toward the improvement of the general welfare of our people through the intelligent development and use of our basic resources.

One of this Department's most significant social and economic achievements during the last year has been the placing on the public market of electric energy from the Columbia River. In December 1939 the first hydroelectric power from the generators of Bonneville surged over transmission lines into the Vancouver substation and thence across the river into Portland, and a great vision of years became an actuality. Under the direction of the Bonneville Power Administration, Bonneville power is vitalizing new defense industries, lighting homes, running factories, electrifying farms, producing new electrochemical and electrometallurgical plants, and seems well on the way toward stimulating a substantial development of the metals industries on the West coast. Bonneville and Grand Coulee power, marketed by a single agency, is destined to remake the economy of the Pacific Northwest. The ultimate results which can be produced by this enormous reservoir of power, unequalled anywhere in the world, are incalculable. Work likewise was pushed successfully on two other great projects. One of them is the Columbia Basin project, of which Grand Coulee Dam is the keystone. This

project will provide water for the irrigation of 1,200,000 acres of land in Central Washington, in addition to creating huge blocks of hydroelectric power. It will create a new region of stabilized farms in what is now a desert.

The second huge project is the Central Valley development in California. Inequalities of moisture, intrusion of salt water, and floods have threatened this verdant valley with ultimate destruction. This is the largest restoration project that we have ever undertaken, and it is progressing rapidly. Shasta and Friant Dams, located at each end of the valley, will regulate both the Sacramento and San Joaquin Rivers and provide adequate water to rescue approximately 2,000,000 acres of highly developed lands. These dams, moreover, will provide additional large blocks of hydroelectric power for the West coast.

In another sphere of activity our progress has been likewise steady. The sprawling bituminous coal industry is being stabilized as quickly as possible. The Bituminous Coal Division in the Department of the Interior went forward with the task of establishing minimum prices for bituminous coal. Stabilized prices in this vital industry will put it in a strong position to meet the demands of the defense program. I regard our work with the bituminous coal industry to be a form of economic buttressing which, in the long run, will prove to be of lasting benefit.

Another defense task which the Department was able to push forward during the year was the search for deposits of strategic and critical minerals. This work was undertaken jointly by the Geological Survey and the Bureau of Mines. Using the basic data accumulated by the Geological Survey, field parties made a careful investigation of deposits of those necessary minerals in which the United States is deficient and dependent upon imports for its supply. First results were more encouraging than was anticipated.

We have undertaken some changes in the Bureau of Mines. As a result of an alarming increase in coal-mine disasters, the Bureau of Mines changed its methods of reporting such accidents. The Bureau used to report the results of its investigations only to the industry, hoping that the latter would change its mining methods to reduce accidents. That system seemed to me not to be working. When the Bartley, W. Va., disaster took 91 lives in January 1940, I ordered that the Bureau make public the result of its findings. The factors in this frightful explosion were thus exposed to the public gaze. Other disasters were likewise reported publicly, and their causes placed on public record. The year's mining casualty record was appalling. Within 8 months, 3 terrible disasters occurred, with a loss of 226 lives. Our investigations showed that, if recommendations of the Bureau of Mines had been followed as thoroughly as they should have been, all of these disasters could have been avoided or at least greatly reduced in severity. The failure of coal-mining companies to enforce the safety practices which the Bureau of Mines has recommended to them, is, in my opinion, sufficient to warrant the enactment of Federal legislation giving power to the Government to enforce necessary safety measures.

In the preservation of natural areas and in the increase of our national parks, we enjoyed a successful year. Two new national parks,

Kings Canyon, Calif., and Isle Royale, Mich., were added, and an additional section was secured for Olympic National Park, Wash. Travel to the parks and public areas continued to increase at a phenomenal rate.

An important step in the consolidation of Federal conservation activities was taken early in the year. In pursuance of your reorganization plans, the Bureau of Biological Survey was transferred to this Department from the Department of Agriculture, and the Bureau of Fisheries from the Department of Commerce. These transfers, together with the establishment of the Bituminous Coal Division, vice the Bituminous Coal Commission, constituted an important three-ply conservation addition to the Department. The similarity of the work of the Biological Survey and that of the Bureau of Fisheries was such that it was possible to merge them. By the end of the year, they were coordinated and welded into a single unit, the United States Fish and Wildlife Service.

Many of the achievements of our Bureaus are worthy of detailed review. Nearly all contributed to the important program of national defense.

BUREAU OF RECLAMATION

During the fiscal year, Federal irrigation projects were prepared to serve more than 106,000 additional acres of new land. More than 23,000 acres were opened for settlement, providing new homes for approximately 261 farm families, dislocated by drought or other misfortune. The demand for this new land far outran the ability of the Bureau to supply. Since the Bureau was established, irrigation works have been placed in operation to serve nearly 4,000,000 acres of land, supporting approximately a million people. Under the present construction program, the largest in the Bureau's history, water will be provided for about 2,500,000 additional acres of new land and about 3,500,000 acres of insufficiently irrigated land to support another million people. The Bureau estimates that as many as 20,000,000 additional acres can be irrigated with water resources as yet undeveloped, under policies now in effect.

Power, an important byproduct of reclamation, loomed with fresh significance in connection with the national defense program during the year. The installation of power equipment and the construction of transmission lines were speeded up to furnish power for the manufacture of airplanes and for other defense industries. Known deposits of strategic minerals, the development of which might require large blocks of power, are located within transmission range or economical transportation distance of Grand Coulee Dam, Shasta Dam, and Boulder Dam. This fact brought special emphasis to power development in those regions.

As has been said, the Bureau's largest construction program is under way. At the close of the year, work was in progress on 27 projects in 13 States. Nine dams were under construction, with four storage dams and a diversion dam newly completed. Five of our dams rank as the world's largest concrete dams. They are Grand Coulee Dam of the Columbia Basin project; Shasta and Friant Dams of the Central Valley project; Boulder Dam, and Marshall Ford Dam of the Colorado River project in Texas.

Grand Coulee Dam, key control feature of the Columbia Basin project, was nearing completion at the close of the year. Economic investigations and soil surveys of the irrigable lands of the project were being successfully pursued. The construction of the Leavenworth station for the conservation of migratory fish in the Columbia River is almost completed.

Excavation work at both Shasta and Friant Dams progressed at a rate that made possible the pouring of concrete. These two dams will regulate both the Sacramento and San Joaquin Rivers.

With eight of the large 115,000 horsepower and one of the smaller 55,000 horsepower units in operation at the Boulder Dam Power Plant, output was almost doubled during the fiscal year. The gross income during the year, including power receipts and payments on power machinery by the lessees, totaled \$5,360,000.

In California the 80-mile All American Canal was practically completed, and progress was made on the 130-mile Coachella Branch Canal, one 40-mile section being completed and work advancing on another 40-mile section. Together these two canals will carry water from the Colorado River to irrigate 1,000,000 acres of rich land, in the Imperial and Coachella Valleys in southern California.

In Colorado, work was under way on Green Mountain Dam and the Continental Divide tunnel, two important features of the Colorado-Big Thompson project. This will provide a supplemental water supply for 615,000 acres of land now under cultivation, situated east of the Rocky Mountains.

Funds appropriated for the fiscal year 1941 make possible the continuation of the work at Marshall Ford Dam on the Colorado River to a height of 271 feet for flood control and power generation. The construction of the dam to the 190-foot height was advanced to 97 percent of completion, and bids had been received for the additional height at the end of the year.

The year's work brought the accomplishments of the Bureau to impressive totals. In its 38 years of existence, the Bureau has completed a program embracing 161 storage and diversion dams; 51 powerhouses; 3,058 buildings; 20,575.9 miles of canals, ditches, and drains; 878 miles of tunnels; 4,802.5 miles of telephone lines; 300.5 miles of dikes; 6,377 flumes; 21,525 culverts; 13,912 bridges; and 202,491 other irrigation structures. Reservoirs of the Bureau have a combined capacity of 51,215,000 acre-feet of water. Crops valued at \$114,082,794 were produced, an increase of \$619,334 over the previous year.

The reclamation fund is decreasing. By the close of the 1941 fiscal year it will be so depleted that the Bureau will be unable to carry on the construction of its projects. Either the reclamation fund should be increased by an advance from the general fund of the Treasury, or certain of the more costly projects now being constructed should be financed by appropriations from the same source, or some other source of revenue should be found.

BUREAU OF MINES

On June 30, 1940, the Bureau of Mines completed its first three decades of service. Since its establishment in 1910, it has undertaken a flexible program to promote safety in the mineral industries,

to conserve mineral resources, and to conduct investigations of the mining, preparation, and utilization of minerals. This year these activities paid remarkable dividends.

As in the emergency of 1917-18, the Bureau of Mines was able this year to devote much of its effort to preparations for the national defense. The Bureau, in cooperation with the Geological Survey, examined 163 deposits containing ores of strategic minerals and sampled 10 others, representing possible sources of antimony, chromium, manganese, nickel, tin, and tungsten. Three deposits disclosed important quantities of strategic minerals. Moreover, in antimony and mercury this country may become self-sufficient, if foreign supplies should become inaccessible.

The Bureau's work was not confined to the prospecting and sampling of deposits, however. Utilizing the tremendous, newly developed hydroelectric facilities of the West, the metallurgical staff made notable advances in developing processes for the recovery of strategic metals (including chromium, manganese, and magnesium) from low-grade or off-grade domestic ores.

The Bureau of Mines compiles statistics on the source, production, consumption, and stocks of minerals. This makes it possible to supply up-to-date, quick, and reliable data to the Army and Navy Munitions Board (especially in connection with stock-piling plans) and to the Advisory Commission to the Council of National Defense, as aids in determining defense policies.

Few people realize the care with which the Bureau is handling the Nation's motor-fuel problem. The Bureau's petroleum engineers are trying to make America's oil resources last as long as possible by showing the industry what it must do to avoid waste. The Bureau is also testing painstakingly all sorts of low-rank American coals to determine their suitability for treatment by the hydrogenation process to yield gasoline. The importance of synthetic gasoline plants to a motorized army is seen from the fact that Britain's Royal Air Force is persistently bombing such plants in Germany.

The Bureau of Mines, Amarillo plant, which enjoys a world monopoly on the production of the lightweight, noninflammable helium gas, completed production of its first 100,000,000 cubic feet about the end of the fiscal year. It is now in a position to supply any military demands that might be made. Its present capacity, which can be expanded, is 2,000,000 cubic feet of helium a month. Helium was utilized first to lift lighter-than-air craft, but is now being applied also to an increasing variety of humanitarian uses, including the treatment of respiratory diseases, administration of anaesthetics, and the prevention of ear block after work at high pressures. It is of interest to note that we are able to sell helium at its cheapest non-Government rate for medical use—\$12.80 per thousand cubic feet—compared to as high as \$150 before the act of September 1, 1937 was passed.

For generations, American manufacturers of sanitary and refractory wares and other ceramics have firmly believed that other countries, principally in Europe, were the only sources of satisfactory raw materials. Now that deliveries from abroad are uncertain and, indeed, drastically cut because of their great bulk and low value, the American ceramists are seeking supplies at home. The Bureau of

Mines has been steadily improving methods of preparing clays and other raw materials from American deposits. It has been conducting successful firing tests on refractories, china, and sanitary wares in the Pacific Northwest, where hydroelectric power from the Grand Coulee Dam is available, and in Tennessee, which is served by the Tennessee Valley system.

Over 1,360,000 first-aid and mine-rescue courses have been given by the Bureau of Mines in its first 30 years, including 986,000 in the coal-mining industry alone. In an endeavor to comply with the requests of the mining industries, the Bureau has emphasized training activities. The unusual number of coal-mine disasters in the past few months, however, points to the need for focusing increased attention on accident prevention.

During the first 8 months of 1940 there have been a number of unfortunate disasters in the coal-mining industry. While 1939 had but one major explosion with a total of 28 deaths, there were three explosions in the bituminous coal mines in the first 8 months of 1940: one, in January, in West Virginia with 91 deaths; one, in March, in Ohio with 72 deaths; and one, in July, in Pennsylvania with 63 deaths. This makes a shocking total of 226 fatalities up to July 15—the greatest number since 1928, when there were 14 major disasters with a total of 326 deaths.

The excessively high average number of fatalities per disaster is as disheartening as it is inexcusable. There is absolutely no question that if known safety procedures were followed in bituminous mines, widespread explosion disasters would be reduced to the vanishing point.

Another disturbing trend in connection with major disasters since 1933 is that, of six coal-mine explosions with a loss of 25 or more lives, all have occurred during the past 3 years. Moreover, five of the six have been in highly mechanized mines. In four of the five the explosion was caused by the blasting procedure; and the sixth (at Sonman, Pa., which occurred in a hand-loading section) was initiated by a machine (a trolley locomotive). This very strongly indicates that while mechanization of coal mines has many undoubted advantages, it also presents hazards which are not being safeguarded as adequately as they should be.

THE BONNEVILLE POWER ADMINISTRATION

On December 1, 1939, the Bonneville Power Administration's first high tension transmission lines, two 40-mile circuits between the Bonneville Dam and Vancouver, Wash., were completed. A few hours later electric power from the Columbia River was being delivered to the Portland metropolitan area. The vision of years—the harnessing of the Columbia River—had become an actuality, and the latent energy of this great western stream had been put to work to produce public power for the people of its territory.

Years of intensive preparation at Bonneville bore dramatic results during the 1940 period. At the beginning of the year, major transmission lines were only partly constructed or existed upon engineers' blueprints. At the end of the period, two 43,200-kilowatt generators were in operation; two 54,000-kilowatt generators were being in-

stalled; 660 circuit miles of transmission line were in operation; 449 additional miles of line were under construction, and 189 miles were ready for contract. A total of 101,350 kilowatts of firm power had been contracted for by industries, municipalities, public utility districts, and private utility companies. Power was surging over the wires at the lowest wholesale rate in America—\$17.50 a kilowatt year at any point on the line. Deliveries ranged as high as 91,000 kilowatts—more than the rated capacity of the generating units. The power contracted for was in excess of the installed capacity at the powerhouse.

With the delivery of power came its corollary—industrial development. Attracted by the large amounts of cheap power which the project is making available, came important metal and chemical industries. The construction of the first aluminum reduction plant west of the Mississippi River was put under way by the Aluminum Co. of America. Shortly after the close of the fiscal year, actual production of aluminum was started with Bonneville power.

This, of course, meant a new source of aluminum supply for the country's defense needs and for peacetime use. Most of the first production was for use in airplanes for the Army and Navy. Thus one of the first dividends to be paid back to the people of the United States on their investment in this project was in the form of modern equipment for national defense. The Aluminum Co.'s first demand of 27,000 kilowatts of energy will be increased progressively until it will be producing on a basis of 60,000,000 pounds of metal a year. Estimates indicate that this amount of aluminum, if converted to airplanes, would provide for the manufacture of any of the following groups of planes: 1,500 Boeing Flying Fortresses; 13,000 Curtiss Hawk 75's; 9,200 Douglas Attack Bombers; 7,000 Twin Engine Attack Bombers; 12,000 North American Dive Bombers; 13,000 Sivirsky Pursuit Ships, or 20,000 Grumman Fighters.

Other industrial contracts for Bonneville power were signed with the Sierra Iron Co., which has planned a plant for pig iron production, and with the Pacific Carbide and Alloys Co., an electro-chemical firm. The importance of this industrial expansion to the national defense cannot be overemphasized.

Eight months after the first power reached the Vancouver substation, the Bonneville Power Administration had executed 23 contracts calling for delivery of 106,850 kilowatts of energy. Of these contracts, 5 were with public utility districts; 10 with municipalities; 1 with an R. E. A. cooperative; 3 with private utilities, and 4 with industries. These contracts, together with prospective sales, assured the Administration revenues during 1941 of \$1,880,000 and of \$4,000,000 in 1942. With power actually available, an increasing number of industrial inquiries were received by the Bonneville Administration relative to possible location of plants. The signing of a considerable number of additional industrial contracts may be expected during 1941.

The extension of the Federal transmission system into all sections of the Pacific Northwest is a guarantee that Columbia River power will be available to all types of distributors and industries at the same low wholesale rate. The interconnection of the Federal system

with other generating plants, both private and public, will assure the Pacific Northwest one of the most dependable supplies of power in the United States. When all the generators are installed at Bonneville and Grand Coulee, they will produce more than 2,400,000 kilowatts. This is more than a million kilowatts greater than will be available from all 10 dams of the Tennessee Valley Authority.

It became apparent during the year that the proximity of the Bonneville and Grand Coulee Dams made it desirable that some common method be established for marketing the large amount of power that the two will produce. Both dams serve the same general area and their location and interconnection will make possible complete service for the Pacific Northwest area. Shortly after the close of the year the organization along these lines was so far advanced that it was possible to promulgate your Executive Order designating the Bonneville Power Administration as the common marketing agency for the power from both projects.

The social and economic significance of the development of 2,400,000 kilowatts of cheap electric energy in the Northwest is enormous. It is impossible at this time to foresee the final results, but the general shape of the things to come in that part of the Nation may be discerned from present trends. Properly administered, this source of energy should have a profound effect in promoting a better physical distribution of industries in this country. It can help to disperse the heavy concentration of industry in the northeast corner of the Nation by making it possible for it to go elsewhere, thus helping to relieve a potentially dangerous military situation inherent in a geographically concentrated industry. With intelligent direction and proper use, it will bring a whole section of the Nation closer to self-sufficiency and will modify the present dependability of that area upon distant centers of industrial production. It will make possible local processing of the natural resources of the northwest and open new avenues for the general betterment of our people.

BUREAU OF BIOLOGICAL SURVEY

With the transfer of the Bureau of Biological Survey from the Department of Agriculture, in accordance with your Reorganization Plan No. II, the Department became primarily responsible for administering the wildlife of the Nation. This national resource, wisely managed, makes important, though in many respects intangible, contributions toward a national strength that is more essential than ever in times of emergency. That country is worth dying for which is worth living in. Conserving wildlife is one way of making a country worth living in. Vacations spent outdoors, in hunting and fishing or in studying and photographing wildlife, develop healthy, happy citizens with a genuine regard for liberty.

The Department has made much progress this year toward perfecting an organization that will promote efficiency in wildlife conservation. The wildlife division of the National Park Service was transferred to the Biological Survey, and there has been a closer coordination of the Survey's work with other agencies of this Depart-

ment. Arrangements for continuing the Bureau's cooperation with its former associate agencies in the Department of Agriculture were effected. And, finally, on the last day of the fiscal year, in accordance with Reorganization Plan No. III, the Biological Survey and the Bureau of Fisheries were consolidated to form the Fish and Wildlife Service. As a result of these changes the Federal Government enters the fiscal year 1941 better organized than ever before to carry on work in wildlife conservation.

Activities of the year were largely concerned with the prosecution of programs already under way, with the result that wildlife conditions in general were again better at the end of a year than at its beginning. This indicates that the Nation is at last on its way toward the restoration of this once abundant natural resource. The most recent of the major programs, providing Federal aid to the States in wildlife restoration, increased in effectiveness during this, its second year. Appropriations were increased from \$1,000,000 to \$1,500,000, and the wildlife conservation projects undertaken by the States grew from 57 in the first year to 237 in 1940. These new refuges were added to the national wildlife refuge system, bringing the total to 263, with an acreage of 13,635,363. In these areas there were noticeable increases in the wildlife populations.

Partly as the result of this refuge program under favoring climatic conditions, but largely as the outcome of the careful regulation of hunting and the strict enforcement of the game laws, a general increase in migratory birds was noted for the fifth consecutive year. The same intensive scientific investigations that revealed these increases, however, also indicated that some species, notably woodcocks and doves, had suffered severely from winter storms during their stay in the South. Precautionary measures were taken to give these birds additional protection during coming seasons.

Wildlife administration has continued to include not only encouragement of desirable species but also intelligent restraint of species that do damage. Control of destructive mammals and birds, carried on more efficiently than ever as a result of the operations of and demonstrations by the Biological Survey, takes on added significance during a national emergency in which food supplies become of critical importance. However, it must be the recognized policy that control should never exceed the demonstrated need for it.

It is to be borne in mind that, although intelligent wildlife administration can further the purposes of national defense, there is need, as with other resources, for extreme caution against a perversion of patriotic zeal that might endanger an important endowment that must be defended. Wildlife conditions in the United States are not yet what they should be. The favorable conditions that do exist are the result of years of planning and of carrying out corrective measures that were sorely needed as the result of unheeding exploitation. The wildlife resource is not a storehouse to be exploited during any presently conceivable period of stress. In emergencies as well as in all future years, the Nation must continue to maintain its now firmly established purpose of restoring wildlife to something approaching its former abundance. It must prudently conserve this great natural resource as one of the American requirements for good living.

BUREAU OF FISHERIES

Throughout the past year the Bureau of Fisheries has continued in its efforts, by precept, example, and regulation, to maintain the fisheries of the United States and its possessions at a level of abundance sufficient to care for current needs and to assure future supplies. To this end the Bureau has conducted investigations and made recommendations which have made possible a more complete utilization of fishery products and byproducts, improved methods of controlling natural enemies of commercially important species, and the adoption of gear and methods of fishing which make possible an escapement sufficient to perpetuate the resource.

During 1938, the most recent year for which complete statistical data on the commercial fisheries are available, the landings of United States fishing craft totaled over 4,250,000,000 pounds. The wholesale value of the products derived from the fisheries was in excess of \$251,000,000. About 250,000 persons were employed in the capture, processing, and wholesaling of the catch.

Throughout the year the Bureau operated 110 fish-cultural stations which produced, distributed, and planted nearly 7½ billions of fish and eyed fish eggs in the coastal and inland waters of the United States. While the major portion of this output was in connection with the conservation of commercial species, more than 151 millions were of the various species which almost exclusively concern sport fishing.

Although statistics of sport fishing for the year are not yet complete, available figures indicate that there has been a substantial increase over the 1937-38 period when it was estimated, from figures supplied by various State agencies, that more than 12 million persons engaged in sport fishing. These figures also indicate that the total expenditures of sport fishermen during that period—fishing licenses, fishing tackle, special clothing, transportation, meals and lodging, boat and guide hire, and the like—were in excess of 875 million dollars.

The Fishery Market News Service, whose function is the regular dissemination of important fishery market information, continued to expand its services. It opened an office in New Orleans, La. This new unit constitutes the sixth of a series of offices which have been set up in carefully selected localities throughout the country. Through these offices it has been possible to release market data covering about one-half of the annual domestic catch of edible sea foods. Additional market news offices will be established from time to time as funds permit, and in the order of their possible service, not only to commercial interests, but to consumers as well.

Through the issuance of daily and monthly published market reports on landings, cold-storage holdings, movements, prices, and other pertinent market data, and through daily radio reports, the Fishery Market News Service is promoting the orderly production and distribution of sea foods. Not only does the fish industry realize the many benefits and opportunities which result from this comprehensive and dependable service, but producers and consumers likewise benefit from it.

In connection with various phases of scientific fishery investigation, the fish-cultural program, and the patrol of Alaskan fisheries, the

Bureau maintains and operates a fleet of 20 vessels, totaling 1,718 gross tons, which, during a national emergency, could be converted into naval auxiliary craft and be placed at the disposal of the Navy. This fleet is supported by numerous small speed and other types of boats which might also serve in some defense capacity, should the need arise.

GEOLOGICAL SURVEY

Continuing its authorized investigations in scientific and engineering fields, the Geological Survey stressed those features of its work most important to national defense. In geologic and related investigations, for example, the Survey carried forward its regular program, and with the aid of a small appropriation which became available on August 10, 1939, made special studies of strategic minerals. These included manganese, antimony, quicksilver, chromite, and others that are so essential in defense but of which our domestic supplies are inadequate in quantity or low in grade. During the year brief reports were prepared on eighteen special strategic-minerals projects. By committee service, and in other less formal ways, the Survey's specialized information in the mineral field was made available to the defense agencies.

Shortly before the close of the fiscal year Congress appropriated a little less than \$2,000,000 for making topographic surveys and maps in strategic and other areas during 1941. This is a slight increase over the amount available in 1940 and it is hoped that it is indicative of a trend toward an accelerated mapping program by the Geological Survey. However, it is less than half the amount immediately needed and recommended by the Interior and War Departments. Adequate topographic maps are important under any conditions in all planning and development that involves the use of the land, but they are particularly essential to successful military operations. About 25,000 square miles in the United States and its dependencies were mapped in 1940.

Spectacular floods and droughts in recent years have continued to hold national attention to the role of water in the national economy. Direct destruction by floods, and the shift of populations brought about by droughts, have greatly disturbed what had come to be regarded complacently as normal developments. They have forced whole regions to recognize that they had been forming conclusions from an inadequate foundation of fact; from an insufficient knowledge of water supplies.

This in turn has led to increased demands for knowledge about stream flow and underground water sources. As a result, each year larger sums have been made available to the Survey for obtaining and analyzing the technical basic data necessary to the proper control and sound utilization of water. Work done for the Army engineers, who supervise flood-control investigations, in 1940 exceeded the record of any previous year.

A special detailed mapping project in Alaska was undertaken at the request of the War Department. The Geological Survey's staff of specialists in Alaskan work also made examinations of strategic minerals in the Territory.

The Survey's work in administering the land classification and mineral leasing laws was also of great importance. In 1940, the Survey made more than 7,500 reports regarding the mineral resources, water power, or storage possibilities of public lands and at the same time safeguarded great Government reserves of coal, oil and gas, potash, phosphate, and other minerals. About \$8,000,000 were received by the Federal Government from lessees and permittees operating on public and Indian lands and from naval petroleum reserves supervised by the Geological Survey.

NATIONAL PARK SERVICE

The National Park Service has had an exceptionally successful year. The number of units in the Federal park system was increased during the 1939-40 period from 154 to 161. The addition of new units and adjustments of boundaries of existing parks increased the total area from 20,817,228 to 21,550,783 acres. More than 15,450,000 persons visited the parks during the travel year ending September 30, 1939. The travel for the period from October 1939, through September 1940, reached the all-time high of 16,741,855 persons. Winter-sports travel was exceptionally heavy. The United States Travel Bureau, which promotes and encourages travel to and within the United States, was placed on a statutory basis by legislation signed by the President on July 19, 1940.

Outstanding conservation achievements were the establishment of the Kings Canyon National Park, Calif., the Isle Royale National Park, Mich., and an important addition to the Olympic National Park, Wash. The creation of the Kings Canyon National Park brought to a successful conclusion a 60-year conservation effort. Absorbed in the Kings Canyon was the 4-square-mile General Grant National Park.

Abraham Lincoln's birthplace, in Kentucky, formerly classified as a national park, was designated the Abraham Lincoln National Historical Park, and Fort McHenry National Park in Maryland was given the more appropriate status of national monument and shrine.

In the District of Columbia the National Capital Parks system and its appurtenances continued to expand in areas and in services to the public. Work continued on the historic Chesapeake and Ohio Canal to develop its unusual recreational potentialities. Additional lands were added to the George Washington Memorial Parkway. With these recent developments, and others pending as the fiscal year came to a close, the park system of the National Capital will be the largest of any city in the United States. If Washington is to continue to merit the distinction of being one of the world's most beautiful capitals, it is imperative that additional funds be available for the maintenance and operation of its parks and national memorials.

Preservation of historic Cumberland Gap, in Virginia, Kentucky, and Tennessee, was authorized by Congress, with the proviso that the lands within the approved boundaries be donated to the United States.

Excellent progress was made on the Blue Ridge and Natchez Trace Parkways. The Skyline Drive in Shenandoah National Park, Va., connecting with the northern terminus of the Blue Ridge Parkway, was completed.

Information concerning the National Park Service and its activities was disseminated to a world-wide audience through the press, by radio, illustrated lectures, literature, and picture service. Wildlife research activities of the National Park Service on January 1 were transferred to the Bureau of Biological Survey. Improvement of wildlife range conditions continued to be the chief wildlife management activity in the Federal park system.

In cooperation with P. W. A., work was continued on the important Historic American Buildings Survey, the purpose of which is to measure and photograph historic structures or those of architectural importance.

Engineering research resulted in the development of a new type of radio antennae for park-ranger patrol cars. Airplane patrols supplemented the customary dog-sled surveillance in Mount McKinley National Park, Alaska. Insect- and tree-disease control was continued. The importance of this activity may be understood when it is considered that the White-pine blister rust in the sugar-pine forests of California ranks next in importance to fire as a menace.

The broad program of conservation and recreation development was continued with the assistance of 310 continental C. C. C. camps in 90 national parks and monuments, 22 recreational demonstration areas, and 198 State, county, and metropolitan parks.

The major problem facing the National Park Service at this time is a shortage of permanent civil-service personnel. The many new activities and additional areas coming to the Bureau have been manned largely by excellent but temporary non-civil-service personnel, principally from W. P. A., P. W. A., C. C. C., and E. R. A. The gradual reduction of such personnel during the past three years leaves the Service not only undermanned, but facing a loss of more than half of its present operating personnel should the emergency programs be closed suddenly. On June 30, 1940, the total personnel was 7,340 employees. Of these, 3,956 held emergency non-civil-service appointments. With employee reductions occurring periodically—frequently several times a year—it is urgent that the Service be placed on a firmer basis with regard to personnel if it is to continue to maintain and operate the Federal park system in accordance with the purposes of Congress.

At the close of the year, Director Arno B. Cammerer was forced by ill health to request that he be relieved of the heavy duties of the directorship of the Service. He was replaced by Newton B. Drury of California.

OFFICE OF INDIAN AFFAIRS

At a time when totalitarian governments abroad are crushing individual conscience and will, it is heartening to witness the tenacious clinging of the Indian to his local democratic institutions. In the United States (and throughout most of the Americas) the Indians have suffered repression for more than 200 years, but in spite of this the local democracy of the Indians has not been destroyed, nor have their institutions been fundamentally modified. Now that these repressions are being lifted, under wise government policies, the Indians of the Americas are emerging to play, in many of the countries, an

important, if not a decisive, role in the struggle for the maintenance of democratic institutions.

The Indians of the United States offer an example for nation-wide conservation by their own efforts to preserve their lands. It was no accident that the Indians turned over to the white man a continent unexploited and uneroded. Conservation is basic in Indian cultures. Always the unity of the Indian with his land was a unity of use, of conservative use, of planned use.

No groups in the country at present are making greater voluntary sacrifices to save their lands than are the Navajos, many of the Pueblos, the Hopis, and others. Tribes that are most archaic in their social forms, such as that of the Acoma Pueblo, have adopted modern technologies of land conservation, range management, animal husbandry, and marketing.

The Indians are growing in numbers at a more rapid rate than any other segment of the population. This is undoubtedly due to the efforts of the past 7 years to help them achieve economic rehabilitation, to wipe out the dread scourges of trachoma, tuberculosis, and other diseases, and to renew the spirit to live through restoring their confidence, prestige, and self-government. This is furthered through intelligent programs of community services, better law and order, and the encouragement of their native arts, crafts, and ceremonies.

The future of the Indian was never, since the white man came, so bright as at this hour. For example, there has been a striking resurgence of Indian arts and crafts. Indian-made rugs, jewelry, baskets, pottery, and other craft objects have taken on a new dignity and prestige under the program to stimulate the fashioning and sale of high quality, authentic Indian wares. The sale of tourist knick-knacks, often represented as authentic Indian goods, has in the past done much to lower the standards of value of native handicrafts. Now, a radically different attitude toward Indian goods has been manifested throughout the country. The campaign to stimulate the production and marketing of better Indian objects is only in its infancy, but it is a very lusty infant.

Native Indian art is advancing because traditional talents are being carefully fostered by skilled teachers. Indians have won conspicuous artistic acclaim through some of their mural decorations, notably on the walls of the Interior Building in Washington and in public buildings elsewhere. One Indian boy, aged 17, won the first prize in a Nation-wide competition in which more than 52,000 contestants participated.

Conservation activities have been too numerous and too diversified to make possible an itemization of recent developments. In Alaska the Eskimos are dependent on their reindeer for food and clothing. After careful and exhaustive studies by the Government, provision was made to purchase all of the nonnative owned reindeer and to turn these over to the natives, where under Federal guidance, proper conservation measures could be effected and pursued. There is hope now that this splendid native people will be able to protect their way of life and become increasingly self-supporting.

On the semiarid stretches of the Navajo Reservation in Arizona, New Mexico, and Utah, a vital part of the program of conservation

has been the necessity to make clear to Indians the intricacies and the importance of modern soil conservation methods. To accomplish this, in part, a new Navajo alphabet has been developed and put into use with helpful results already manifested. Another phase was a huge round-up of wild horses undertaken as a means of disposing of these economically unproductive animals. To the Navajo, the horse is a symbol of prestige, and the fact that he consented to part with his horses indicates the extent to which the need for soil-saving has become apparent.

Indians are developing some remarkable abilities as businessmen. Many tribes, some of them mistakenly considered "backward" and "primitive," have responded surprisingly to new responsibilities given to them under the Indian Reorganization Act, the Oklahoma Act, the Alaska Act, and the present general policy of giving Indians an increasing measure of self-government.

Indian judges are administering Indian law on many reservations with much of the dignity and prestige of the leaders of another day. Indian tribal courts have been revived, increased, and strengthened and the Indians are rising to the new responsibilities involved.

Indians are being employed in their Indian Service in steadily increasing numbers. In striking contrast to the situation 10 years ago, there were in October 1939, 4,669 Indian men and women on the permanent employment rolls. This number has grown considerably since that date. In addition, 13,771 are employed in emergency jobs, including the Indian Division of the Civilian Conservation Corps, a separate segment of the C. C. C.

Numerous skills and talents have been developed among Indians and many of the more important official positions are being filled by Indians. Many Indians trained to take jobs outside of the Service are not only being placed in positions, but are making noteworthy successes therein.

Indians of the United States are reflecting in a great many ways their awareness that for them a new day has come. With new advantages they are acquiring new responsibilities and, thus far, they have shown willingness and capacity to meet both the problems and the opportunities.

THE DIVISION OF TERRITORIES AND ISLAND POSSESSIONS

During the year the Division continued its administrative functions of coordinating Federal activities relating to Alaska, Hawaii, the Equatorial Islands, Puerto Rico, and the Virgin Islands. The Philippines were brought within the Division at the beginning of the fiscal year, when they were transferred from the War Department under Reorganization Plan No. I.

On June 24, 1940, Dr. Rupert Emerson took over the duties of Director of the Division of Territories and Island Possessions, succeeding Dr. Ernest Gruening, who was appointed Governor of Alaska.

ALASKA

Activities throughout the Division have expanded considerably due to the vast defense programs which have been inaugurated in some of these areas. For Alaska, where Army and Navy air bases

are being rushed to completion at various strategic points, the Department of the Interior is supporting a bill (S-3577) which would make possible accelerated development and colonization of this sparsely settled Territory. The plan, in effect, would provide "a defense behind the defense" in the form of an active population to furnish needed supplies and services to the regular troops which will be stationed there. It is generally conceded that new activities and industries must be developed in Alaska if the Territory's economy is to be built up and maintained.

HAWAII

During the year, the Division of Territories maintained a close interest in the program of sugar legislation now before the Congress, constantly attempting to secure adherence to the basic principle that Hawaii, and also Puerto Rico and the Virgin Islands, be accorded the same treatment as other sugar producing areas under the American flag. Sugar remained the primary industry of Hawaii. Shipments to the mainland were valued at \$55,217,960.

THE EQUATORIAL ISLANDS

In accordance with the terms of a license issued by the Department of the Interior in behalf of the United States Government, Pan American Airways, Inc., has established equipment and personnel on Canton Island in connection with the operation of its trans-Pacific air transport service. Inasmuch as Pan American Airways contemplates permanent occupancy of Canton Island, consideration is being given to the withdrawal of the four Department of the Interior employees now stationed there.

THE PHILIPPINE ISLANDS

An amendment by Congress on August 7, 1939, of the Independence Act of 1934, provides for a more orderly adjustment of the Philippine economy prior to political independence.

In the Philippines, steps were initiated to provide for three amendments to the Philippine Constitution: One, to permit the re-election of the president, and to substitute 4-year terms for the existing 6-year term; another, for the re-creation of a bicameral legislature to replace the unicameral legislature now existing; and a third for the establishment of an independent committee on elections. These were approved by the people of the Philippines in a plebiscite held on June 18, 1940, but at the end of the fiscal year they had not been submitted to you for consideration.

All reports indicate that the Commonwealth government is at the present time in an excellent financial condition. However, the Islands are faced with a tremendous problem of economic adjustment inasmuch as, under the terms of the Independence Act, they will lose the privileges of free trade with the United States in 1946. The seriousness of this problem is well recognized in the Philippines and some steps are being taken to readjust the Islands' economy. However, much remains to be done.

PUERTO RICO

The finances of the Insular Government continued in a satisfactory condition. Business conditions improved during the year, although there is still much unemployment. This is due in part to the quota on sugar, and to the closing of needlework factories since the enactment of the Fair Labor Standards Act. A committee has been appointed by the Wage and Hour Division to investigate conditions pertaining to the needlework industry in Puerto Rico, and to recommend minimum wage rates.

THE PUERTO RICO RECONSTRUCTION ADMINISTRATION

The Puerto Rico Reconstruction Administration continued its program during the year with major emphasis on projects of rural rehabilitation. Although obligated funds available were approximately 30 percent less than in the preceding year, there was no diminution of the Administration's efforts to help the Puerto Ricans toward a sounder economy. Substantial progress was made in soil conservation, reforestation and the construction of the Dos Bocas hydroelectric project. Guidance was given through the central service farms looking to better methods of farming and marketing. The continuation of the cattle tick eradication program promises a better supply of meat and milk so badly needed in the Island. In all of this work valuable cooperation has been extended by the Agricultural Extension Service, the Insular Department of Agriculture and Commerce, and the Federal and Insular Experiment Stations.

Through its Cooperative Division, the P. R. R. A. has maintained supervision of the various cooperatives previously financed by Government loans, and has aided in the organization of three additional small cooperatives. The production of winter vegetables for the New York market has been stimulated with good results. The cultivation of onions, previously imported to the island, and of vanilla, another source of new income, have shown encouraging progress. Loans have been made to needy farmers who had no other available source of credit for the growing of subsistence crops and the purchase of livestock and poultry.

The operations of the Lafayette sugar mill cooperative have been satisfactory. The plant constructed for the conversion of sugarcane byproducts into solvents such as butyl alcohol and acetone is now in full operation. These byproducts will not only provide income beyond that realizable under the quota restrictions applicable to raw sugar, but may be important sources of supply for elements necessary in connection with the defense program. The 12 land cooperatives, however, to which sugar lands were sold on the credit of the Government, have not been as successful as the sugar mill cooperative, and will have to be liquidated. It is planned to subdivide the lands and to sell them in relatively small parcels to experienced sugarcane growers, safeguarding the investment of the Government while at the same time realizing the fundamental objective of the project for more equitable distribution of sugar lands.

Despite its limited funds and authority under the Emergency Relief Appropriation Acts, the P. R. R. A. has made substantial contributions toward relieving the economic distress of the island. No mere palliatives can solve the basic problem of a dense and ever-increasing population struggling to wrest a livelihood from exceedingly limited resources. The unemployment situation, which still remains most serious, has been temporarily relieved to some extent by the intensified national-defense work now in progress. Possibly the recent amendment of the Fair Labor Standards Act, providing for a special committee to study and recommend minimum wages to be paid to employees in Puerto Rico, may improve the condition of that part of the population which is dependent upon commerce as distinguished from agriculture. This, however, will not solve the problem of how to create a sufficiently increased income to support nearly 2,000,000 people.

Further industrial and agricultural development of the island is imperative; for that development progressive leadership and capital for full utilization of the island's resources must be found. Only in part can this be accomplished by a program of relief spending. Nevertheless, such spending cannot be terminated unless substitutes in the way of more satisfactory remedies for permanent cure are put into immediate effect. What the P. R. R. A. has done has at least given hope to thousands of people who otherwise would have been cast into utter despair. Weakness of one part of our body politic may effect the health of the entire body; therefore whatever is done to help the inhabitants of this strategic outpost of defense, may well be considered not merely one of emergency relief, but an important element in our program of national preparedness.

THE VIRGIN ISLANDS

During the greater part of the year, there was marked unemployment in the islands. This situation was relieved in St. Thomas by the initiation of projects in connection with national defense.

The general agricultural economy of St. Croix, however, has been at a low ebb for the past 3 years due to a severe drought, which continued during 1940.

Federal funds amounting to approximately \$400,000 from appropriations made to the Work Projects Administration were made available to the Virgin Islands in 1940, for a large variety of projects. A total of \$240,000 in Public Works funds also was made available for the building of an abattoir in St. Croix, as an aid to the cattle industry, and for the construction of a public market in Charlotte Amalie.

THE VIRGIN ISLANDS CO.

Sales figures for the 1940 fiscal year are not yet available. In the fiscal year 1939, the Virgin Islands Co. sold \$75,607 worth of raw sugar, \$88,436 worth of Government House Rum, and \$14,364 worth of a special distillate.

Although the 939 growers of sugarcane in St. Croix come under the restrictive provisions of the Sugar Act of 1937, the Congress has not yet extended to them the benefit-payment provisions of the act as an offset. St. Croix growers are the only ones under the American flag

who are treated with such discrimination. In addition, St. Croix growers, unlike other American growers, are required to pay an export tax of \$6 per ton on all the raw sugar shipped to the continental United States. It is essential that remedial legislation be enacted by the Congress to overcome these discriminations. Strong efforts also are being made to secure the enactment of legislation to transfer to the government of the Virgin Islands all taxes collected under the internal revenue laws of the United States on articles imported into the United States from the Virgin Islands.

GENERAL LAND OFFICE

The facilitation of national defense and the continuation of the program for conservation of the resources of the public domain were the primary objectives of the General Land Office during the year. The chief contribution to the defense program was to make available to the War and Navy Departments the broad areas of public lands which are suitable for military and naval purposes. Withdrawals of the public lands and requests for withdrawals in connection with the national defense program during the year embraced more than 7,000,000 acres. In addition, all outstanding aviation leases and beacon light permits contain provisions under which the Secretary of War may assume full control over the lands whenever the President deems them necessary for military purposes. A total of 41,369 acres has been withdrawn for air-navigation purposes.

The food supply of the Nation is vital to national defense, and a prime factor in the food supply is potash as a fertilizer. As a result of the war, shipments of this material from Europe and elsewhere have practically ceased. To meet the emergency, over 6,000 acres of land, comprising the greater part of the dry bed of ancient Searles Lake in California, have been leased. This area is rich in potash and the supply which will be available from this source, together with other potash produced in this country, largely from land leased from the Government in California and New Mexico, should be sufficient to meet all domestic needs.

For many sections of the United States, the township plats which depict the public land surveys, including the general topography, supply the only map data available for military purposes. The rectangular system of surveys supplies a simple, concise, and definite identification of the boundaries of lands. During the year cadastral engineering activities resulted in surveys embracing 5,693,105 acres, in addition to engineering investigations and special projects. The surveys cover a total of 35,540 miles.

The change from the system of issuing permits for oil and gas prospecting on the public domain to the system of issuing leases, has been practically completed. The change was designed to aid in the conservation of oil and gas resources, to prevent speculation and to secure more adequate returns to the United States from such resources.

The management of the timber resources on the approximately 2,500,000 acres of revested Oregon and California railroad and reconveyed Coos Bay Wagon Road grant lands in Oregon was furthered by additional research, and by the inventory, classification, and estab-

ishment of improved procedures for maintaining sustained yield timber cutting.

Substantial progress was made on an inventory of the resources of the public domain, the mapping of the public-domain lands, the classification of lands, and the assembly and analysis of information concerning the economic resources of Alaska.

In order to secure increased benefits to the people from the use of the public lands, regulations were issued providing for an annual rental of \$5 per mile or fraction thereof, for rights-of-way over the public lands for telegraph and telephone lines, tramroads, oil and gas pipe lines, water pipe lines, ditches, and canals. A charge of \$5 per acre or fraction thereof per annum also was imposed for the use of public lands for reservoirs, water plants, well sites, and other like structures.

GRAZING SERVICE

The impact of events abroad have brought to American citizens a deeper realization of the need for range conservation in the national preparedness program. The vital importance of a continuous, adequate supply of food and clothing, based on the forage resources of the western ranges, became more clearly recognized during the year. Conservation of the Federal grazing lands of the West, from which is derived a large part of the beef, mutton, wool, and mohair essential to our daily lives, became an integral part of our national-defense program.

The sixth year of grazing district administration by the Grazing Service witnessed sound advancement in the improvement and orderly use of the western ranges. In response to popular demand, both locally and nationally, the program was enlarged in scope as well as in area. Efforts were directed toward coordinated use and planning for the protection of the resources and the benefit of the people who are dependent upon grazing.

Aligned with programs for the protection and improvement of the the range was a general plan for the development of a correlated land pattern in the districts.

Many of the perplexing problems involved in a mixed ownership of interdependent land amounting to more than 250,000,000 acres were ironed out. Cooperation with States, counties, railroad companies, and individual landowners reached a new high during the year. An amendment to the Taylor Grazing Act on July 14, 1939 (Public, 173, 76th Cong.) welded further the mutual cooperative efforts of the stockmen and the administration. Advisory boards, elected by the range users, functioned with greater interest and efficiency than theretofore. During the past year these boards were brought more prominently into the planning end of range administration. This system of local representation encouraged direct conservation practices by the licensees and permittees.

Security in land tenure is the biggest problem facing the livestockman of the West today. If he is to plan and manage his business successfully he cannot be constantly confronted with the hazard of competitive, unstable land policies. The stabilization of the grazing district land pattern will go far toward meeting the stockman's need.

Three additional grazing districts were established during the year, increasing the number to 53 and the acreage of Federal range area to 140,847,900. Grazing licenses and permits were issued to 20,609 stockmen owning 11,930,964 livestock.

Mutual cooperative efforts between the stockmen, the Service, and numerous other citizens brought about the largest possible amount of citizenship participation in the development and use of the range resources. Studies and plans were directed toward possible emergency needs for greater facility in the production and distribution of essential livestock products. It is a pleasure to report that the range country is now in a better position than ever before to meet present and future emergencies. Production can be kept on a continuing basis without undue injury to the land or the forage. With the help of 555 district advisers and the cooperation of all of the range users, the livestock business can be maintained on a high productive level consistent with wise use of the required resources.

In cooperation with the Civilian Conservation Corps, the Grazing Service operated 89 C. C. C. camps engaged in range improvement work in the Federal grazing districts. Activities ranged from exterminating insects and rodents to fighting range fires. Water development continued as the outstanding need in the range conservation work. Flood control, erosion control, range revegetation, and fence construction, trail building, eradication of poisonous plants, rodents, and predatory animals, all contributed to a better range and a healthier livestock industry.

Work on the ranges has developed a reservoir of men and equipment useful for any defense emergency. Should the need arise, equipment such as trucks, tractors, and concrete mixers, manned by skilled operators, could be mobilized and used locally for building and repairing roads, dams, air navigation sites, or other facilities. In addition, maps, showing roads, towns, and general topography are available for both civilian and military use. Base maps of this nature already completed cover 535,680 square miles in 10 western States. Developed primarily for use in range administration, these maps are useful in the defense program, especially in connection with air and land maneuvers and border patrols.

Within the boundaries of grazing districts are many known undeveloped mineral deposits and a number of mines producing essential war minerals. Men and equipment in the Grazing Service could be thrown into active service to facilitate the production and transportation of such raw materials. In the event of emergency, Grazing Service personnel is instantly available for patrol duty to guard roads, bridges, reservoirs, and other structures as well as water supplies in outlying sections of the West. In keeping with the national preparedness program, range conservation is one of many important "behind-the-lines" activities of today.

DIRECTOR OF FORESTS

It is also a matter of gratification to be able to report that the forest resources under the jurisdiction of the Department of the Interior are so strategically situated and so well developed as to be able to make substantial contributions to the national defense. These resources were under development during the World War of 1917

and contributed in full measure to our efforts at that time. During the existing emergency, we are in a position to furnish large volumes of essential forest products. The administrative units throughout the service are being so organized as to meet any increase in demand which may develop.

As is well known, forest administration has been one of the principal functions of the Department of the Interior since it was established in 1849. The Department was first among the executive establishments vested with administrative responsibilities in forestry. Long before the creation of the first National Forest reserve in 1891 and the granting of authority to administer the National Forest reserves in 1897, the Department put forth special efforts through its various bureaus and offices to protect and promote the interests of the Federal Government in the forests of the public domain and on other Federal lands.

Because of the highly diversified conditions which characterize the public domain, the National Parks, and the Indian lands, the Department of the Interior carries on a wider range of forestry functions and activities than any other Federal Department. It is significant that today, almost two-thirds of the area of all Federal lands in the United States proper is under the jurisdiction of the Department of the Interior. If Alaska is included, then Interior's jurisdiction extends over almost three-fourths of all Federal lands.

Owing to these large holdings, the activities of the Department in the field of conservation are of material importance in the determination of the Nation's timber budget and the concomitant influence of timber and forage growth. The wide problems of public policy in regard to forestry are being studied by a Joint Congressional Committee on Forestry. As an aid to this committee, the Director of Forests prepared a detailed report on the conservation policies of the Department. The report recommended that Indian forest reserves be established and operated on a cooperative sustained-yield forest management. It also urged the bringing under sustained-yield management of the unreserved public domain lands intermingled with and lying adjacent to the revested Oregon and California grant lands. It further recommended that legislation be enacted authorizing the sale of forest products from areas within grazing districts under appropriate rules and regulations. It found, too, that funds are needed for listing the scattered, unreserved public domain lands not included in grazing districts, and for surveying their resources.

In addition to preparing the extensive report for the Joint Committee on Forestry, the Director of Forests prosecuted an extensive program of forestry activity during the year. Marked progress was made in perfecting the organization of the O and C grant lands. A large volume of Indian forestry business was handled, and two important Indian timber damage suits were brought to a successful conclusion. Extensive assistance was rendered to the Land Committee of the National Resources Planning Board. Advisory services were given in a large number of cases and help was forthcoming on problems of the various agencies of the Department having administrative responsibility in forest conservation.

DIVISION OF INVESTIGATION

The Division of Investigations made substantial contributions to the defense program during the past fiscal year. The War Department was assisted in its program of national defense through the examination and classification of lands withdrawn for artillery ranges, aircraft bombing ranges, and other defense purposes, and in one case the Division assisted the Department of Justice in obtaining a restraining order to prevent mineral claimants from performing work that was interfering with the use of the land as an airplane landing field for Army bombers. This cooperative work by the Division is continuing and will result in the cancellation of additional thousands of invalid mining claims, thus helping the War Department to protect itself from unjust claims for damages by persons attempting to hold title to the lands.

Information concerning the status of public lands, gathered through the past several years in investigations for the Grazing Service, is being made available to the Army Air Corps for the purpose of enabling it to arrive at a decision as to what lands might be desirable for inclusion within certain proposed bombing and gunnery areas.

Land classification and appraisal work by the Division has produced information of value to the Geological Survey in the location of mineral deposits vital to the national defense program.

PETROLEUM CONSERVATION DIVISION

Conservation of our petroleum resources continued to gain importance during the year as the outlines of our defense program were formulated. The mechanical implements of defense which we propose to increase so drastically are all dependent upon gasoline and oil for their operation, and as a consequence, heavy new demands face our petroleum industry. Warships, tanks, prime movers, mechanized units, and aircraft all need gasoline and oil. The large additions to the Navy, the mechanization of the Army and the huge increase in our air force make an adequate supply of gasoline and oil more imperative than ever before.

The Petroleum Conservation Division has no authority to enforce Federal regulation of the oil industry and has never attempted to do so. But within its sharply limited field of action it has been vigorous in its efforts to produce sensible conservation of our vital supplies of petroleum. During the year it continued to aid in the administration of the Connally law and cooperated with the Interstate Oil Compact Commission, as well as with the oil and gas producing States.

The Division was active in the investigation of alleged violations of the Connally law. Its year's activities brought the total number of cases that it carried to prosecution in the courts to 125. Out of these, it has won 121 convictions. Fines assessed and bonds forfeited since enforcement was started totaled \$231,100, of which \$50,000 were assessed during the fiscal year.

Activities in the East Texas field continued at a fast pace. The Federal Tender Board reported a successful year with more than 98 percent of the production being accounted for to the Board. The East Texas Board reported that, for the first time, there was a diminu-

tion in the number of new wells drilled in that field. Fewer wells were drilled during the year than in any other year since the field was opened.

During the year, the Division cooperated with numerous Government agencies working on oil problems. Its technical aid and expert assistance were requested on several occasions and its trained personnel were called upon to handle many defense problems relating to petroleum.

The experience of the Division in dealing with the industry and with State bodies governing petroleum production continued to show the desirability of some form of Federal regulation to assure that there should be no unnecessary wastage in the extraction of this vital—and definitely limited—resource.

BITUMINOUS COAL DIVISION

The complex problems of the bituminous coal industry became a matter of concern for the Department this year with the establishment of the Bituminous Coal Division. In accordance with your Reorganization Plan, the Bituminous Coal Division took over the functions of the old National Bituminous Coal Commission and proceeded at once with the work of establishing minimum prices and marketing rules and regulations for the industry.

In less than 4 weeks after the transfer of functions, the new Division reopened the hearings on prices which had been started by the old Commission. Six months of continuous hearings were required to allow nearly 400 parties to make their appearance. Working under pressure, the Division, by the end of the year, was in sight of its goal—the promulgation of prices and rules. These were put into effect 90 days after the close of the year. By firm application, and by strenuous and devoted effort, the personnel of the Division were able promptly to accomplish the task.

As prices did not become effective until after the close of the year, I cannot report upon experience in marketing coal under them. It is not possible, therefore, to forecast with certainty their effect upon the conditions which the Coal Act seeks to alleviate. The fact that we were able to make such outstanding progress with a vexatious problem, however, generated considerable optimism in the coal industry.

The objective of the Bituminous Coal Division, of course, is to bring a generally demoralized industry up to a par with American industry in general, without inflicting undue injury upon consumers. The problems that the industry faces are many and involved. Price demoralization is only one. The competition of other fuels and of transportation are others. The welfare of the coal industry is of paramount importance to the national defense. It furnishes about 85 percent of all fuels and energy consumed by railroads, 49 percent of that used by electric utilities, and about 75 percent of that used by general manufacturing plants. Bituminous coal is a source of basic raw material for hundreds of important commodities.

The method by which we are seeking to restore some order into the bituminous coal structure is through market stabilization. I feel that we are at least on the track and moving. I do not for a moment

consider that what we have accomplished represents perfection, but I am certain that we have established a mechanism, which by changes and refinement, can attain wholesome results.

In setting minimum prices, the Division has not attempted, nor was it instructed, to remake the coal industry, or to set prices according to its own conception of efficiency or in keeping with a planned economy. The prices were designed to yield the industry an income equal, as nearly as possible, to its average cost, and at the same time to preserve for the coal producers such "fair" competitive opportunities to sell their coal as they enjoyed under unregulated competition. However, the prices were formulated with the view firmly in mind that the Coal Act necessarily eliminates the "competitive opportunity" of producers to attempt to make inroads on markets by price cutting which results in lowering the industry's income below its average cost. The law also eliminates the "competitive opportunity" to make sales by means of dumping, the sale of "distress coal," manipulations resulting in discriminations between individual consumers in the same market, and all the other chaotic forces which were present in bituminous coal markets under free and open competition.

OFFICE OF THE SOLICITOR

During the year, the Office of the Solicitor rendered valuable assistance in the solution of problems having a vital bearing upon national defense. The conservation, protection, development, and utilization of petroleum and other mineral resources; the harnessing of water power for the production of hydroelectric energy; the maintenance of the livestock supply without which no army could long continue to function, and the contribution of the public lands to the upbuilding of a strong national economy—these are all activities which would be almost impossible without the competent legal services rendered by this Office. An analysis of the work in the immediate office of the Solicitor indicates that its volume was approximately 20 percent greater than during the preceding fiscal year.

The famous Section 36 Elk Hills oil field case—one of the most important and prolonged public-land controversies ever to come before this Department or the courts—was brought to a successful conclusion during the year. Affirmance of the decision of the District Court for the Southern District of California by the Circuit Court of Appeals for the Ninth Circuit, and the denial of a vigorously pressed petition for certiorari by the Supreme Court of the United States resulted in the quieting of the Government's title to a square mile of valuable oil lands in the geologic center of a naval petroleum reserve. This case also resulted in the recovery of approximately \$7,137,000 from the Standard Oil Co. of California as damages for the oil and gas extracted from that section while adversely held under claim of title.

The decision of the Solicitor in a similar controversy involving section 16 in the Elk Hills field determined another square mile of oil lands, probably worth several million dollars, to be property of the United States.

Another public-land controversy of scarcely less importance, in which a favorable decision was rendered by the Supreme Court dur-

ing the year was the case of *United States v. City and County of San Francisco*, involving the distribution of electric power from the Hetch Hetchy project in California. The decision of the Supreme Court upheld the constitutionality of the provisions of the Raker Act of December 19, 1913, requiring municipal distribution of electric energy produced through the use of lands and rights-of-way granted San Francisco under that act, as a valid exercise of the power of the Congress to control the disposition of the public domain. The Court sustained the contention of the Department that the arrangements for the distribution of such energy made by San Francisco were not in conformity with these provisions.

PERSONNEL AND MANAGEMENT

The Division of Personnel Supervision and Management reports that at the close of June 30, 1940, there were 48,947 employees in the Department and that the total expenditure for the fiscal year for salaries and wages was \$72,684,666. Improvements and techniques in personnel administration have been introduced to keep pace with the growing needs of the Department. One innovation worthy of special mention is the setting up of a central stenographic training center, into which new stenographers pass for a two weeks' training course in the Department's correspondence style and procedure. Another is the preparation of a stenographers' handbook as a textbook guide for all stenographers in the Department. Thus, the bureaus and offices have been relieved, to a great extent, of the initial training of these employees.

The personnel actions handled during the year by the Division totaled 29,568; 12,849 applications for employment were received and reviewed; 1,536 applicants were interviewed. In recruiting employees for noncivil service positions, primarily in connection with the Civilian Conservation Corps activities, the Division operates as a miniature civil service commission in rating applicants, establishing registers, and certifying eligibles. In this connection, 2,137 certificates of eligibles, containing 4,549 names, were issued by the Division during the year.

The average amount of annual leave used per person in the District of Columbia was 24 days; average sick leave, 8 days. The records show that during the year 92 employees retired because of age and optional age, and 76 on account of disability.

CONCLUSION

This outline of conservation in progress indicates that our people are finally alert to the nature of the problem we face in the administration of our resources. They have begun to weigh the social consequences of individual action when it involves a looting of the heritage that we have received from Nature.

But much still remains to be done. In the coming months, as the pace of defense quickens and short cuts in the form of resources raids are threatened, our conservation principles will be put to the test. The story of what is involved for this Department is told in the full reports of our Bureaus and Offices which I herewith transmit for your consideration.

One thing is clear. The wisdom of the policies that we have followed for the last 7 years is now bearing fruit. We are rich in resources, because we have put our house in order. Our natural wealth forms the sinews and muscles of our defense machinery. We will continue to administer prudently our resources for present use, and for defense when we must, and guard them for the future, always.

Very respectfully,

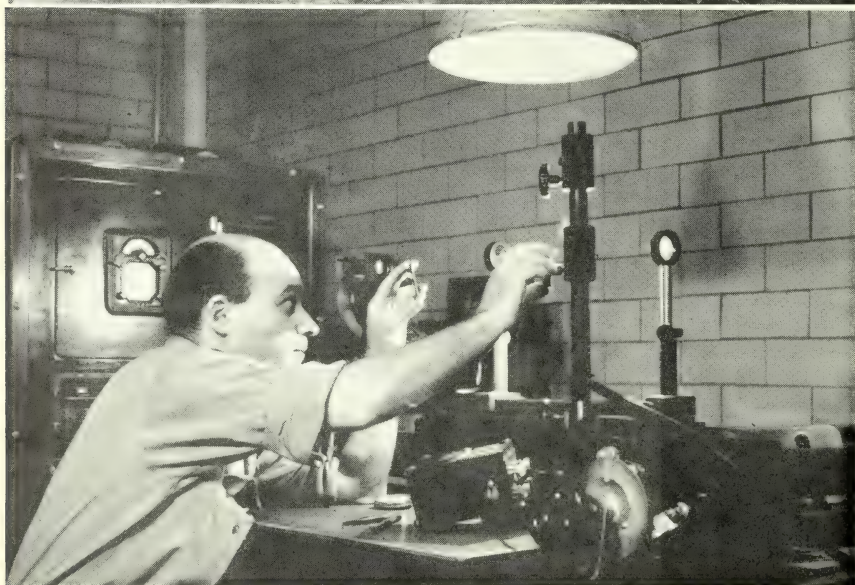
Harold L. Ickes

Secretary of the Interior.



DIGGING IN FOR DEFENSE.

Bureau of Mines experts drill blast holes by hand in study of strategic mineral deposits in Idaho.



MINE SCIENTISTS AID INDUSTRY.

Upper: Bureau of Mines men demonstrate how coal-dust explosions in mines can be prevented by rock dusting.

Lower: Eyes that see through rocks. Bureau of Mines spectograph operator can determine in 30 minutes the mineral contents of rocks requiring three days of analysis by chemists.

BUREAU OF MINES

R. R. Sayers, *Director*

THE fiscal year 1940 was especially significant to the Bureau of Mines because it marked completion of three decades of service to American mining. The Bureau's organic acts (36 Stat. 369 and 37 Stat. 681) authorized it to promote safety in the mineral industries, to conserve mineral resources, and to conduct investigations on the mining, preparation, and utilization of minerals. Although the Bureau now carries on a wide variety of activities and has established experiment stations and other field laboratories in a number of American mining centers, its basic program still follows closely the three fundamental lines established by Congress.

Inasmuch as any program of military preparedness depends on an unobstructed flow of minerals, the Bureau of Mines, by virtue of the duties specified in congressional acts, is in reality an important defense agency of the United States Government, a fact emphasized by many activities of the past fiscal year. Moreover, the Bureau operates a plant that produces virtually the world supply of helium and in a war emergency automatically supervises the licensing of explosives for nonmilitary use.

An outstanding example of the conversion of statistical data to defense purposes was utilization by the Advisory Commission to the Council of National Defense of the Bureau's long-standing files on sources, production, consumption, and stocks of strategic minerals. In fact, the Commission's mineral consultant established headquarters in the Bureau of Mines and made its files the basis for setting up his own records. Statistical information supplied by the Bureau also aided the Army and Navy Munitions Board in its stock-piling program; other data were most valuable to the National Resources Planning Board. The embargo on steel scrap proposed by the Advisory Commission threw the Bureau's improved scrap-metal canvasses into sharp focus. Data were compiled for defense agencies on abrasive diamonds, asbestos, graphite, quartz crystals, mica, iodine, and other nonmetallic commodities essential to a military program. The Bureau's foreign mineral specialist completed surveys on the mineral resources, production, and trade of Argentina, Bolivia, Chile, and Peru and assisted procurement boards to find new sources of

supply for materials cut off by the European war, including tin, tungsten, chromite, antimony, mica, and the ever-important manganese.

The so-called Strategic Minerals Act authorized the Bureau to examine deposits that might be a source of strategic minerals in a war emergency. Ten such deposits were tested by surface trenching, pitting, and diamond drilling, and 163 others inspected more briefly. Results indicate significant quantities of strategic minerals in 3 of the deposits and the possibility that in an emergency the country could be self-sufficient as regards antimony and mercury. Bureau of Mines metallurgical laboratories completed 11,718 analyses and other tests of samples shipped from the field.

Other Bureau of Mines activities of the past year that concerned the national defense program were: Conservation of high-rank coals by testing the combustion and carbonizing properties of low-rank coals; production of benzol, toluol, and xylol (necessary for explosives) as byproducts of the coking of coal; hydrogenation tests of American coals to find their value as a source of motor fuel; metallurgical investigations of the production of electrolytic manganese and magnesium metal; expansion of information on demolition explosives; survey of aviation gasoline; substitution of American non-metallic minerals for a wide variety of commodities imported from abroad; and emphasis on the instruction of first-aid teachers who could train civilians in an emergency.

The Bureau of Mines, believing, with its first Director, that "True conservation is a wiser and more efficient use of our natural resources," endeavors to conserve America's minerals by improving methods of mining, preparing, and utilizing them. No activities of the Bureau exemplify this more clearly than its work on solid and liquid fuels. During the past year especial efforts were devoted to ascertaining the coking properties of America's low-rank coals to establish the extent to which they can replace steam and coking coals of higher rank and dwindling supply. The Bureau also tested coals from seven States to find how readily they liquefy to produce motor fuel and useful byproducts of the hydrogenation process. Meanwhile, the Bureau's petroleum engineers studied energy relationships to find how the greatest amount of petroleum can be produced with the least waste of natural energy, oil, and gas.

Correlative economic studies on fuel included a continuing survey of coal, petroleum, natural gas, and electricity available for consumption in the United States and Canada; summaries of the competitive-fuel situation in the anthracite-consuming States; reports on the substitution of fuel briquets and packaged fuel made from fine coal for lump coal in domestic heating; monthly forecasts of the demand

for petroleum; and collection of data on the consumption of fuel oil, range oil, and kerosene.

Establishment of headquarters for the Bureau's metallurgical work at Salt Lake City made laboratory and pilot-plant facilities readily accessible to mining industries of the West. Much attention is being focused upon methods of recovering important metals from low-grade or off-grade ores. Laboratory tests of an electrothermal process for producing magnesium metal from magnesite have been encouraging. Preliminary investigations of the characteristics of manganese made by the Bureau of Mines electrolytic method were followed by tests of this material in a series of manganese alloys. Economic studies of metals endeavor to promote orderly development of domestic resources by providing data on production, consumption, and stocks of virgin material as well as reporting the results of canvasses on consumption and stocks of ferrous and nonferrous scrap.

At several experiment stations the Bureau is applying ore-dressing methods to domestic nonmetallic minerals to produce satisfactory grades of ingredients for a wide variety of commodities, formerly supplied from abroad. Almost any type of clay-working properties can be developed from domestic materials. It is of especial interest that North Carolina alaskite has been found to be a potential substitute for British Cornwall stone and that domestic olivine can be used instead of imported magnesite in refractories. Special economic data were compiled on nonmetallic minerals that must now be obtained from domestic sources.

The 1940 edition of *Minerals Yearbook*, the Bureau's annual review of sources, production, distribution, and stocks of minerals comprises 69 chapters, about two-thirds of which have been published as preprints.

No annual report of the Bureau of Mines would be complete without a brief summary, at least, of special services performed upon request for Federal and State agencies and the mineral industries. This year added burdens were entailed by work requisitioned in connection with the defense emergency.

An unusual number of requests concerned petroleum. Bureau specialists prepared comprehensive reports on petroleum production and manufacture for a subcommittee of the House Committee on Interstate and Foreign Commerce and for the National Resources Planning Board. For the Biological Survey, they studied the effects of an uncontrolled oil well on a Texas waterfowl refuge and, for the War Department, the results of building a dam that would inundate Oklahoma oil-bearing lands. Illinois, Kansas, and Oklahoma asked for help in disposing of oil-field brines.

Power-plant and fuel-efficiency surveys were made for Federal establishments and the District of Columbia Government, acceptance tests of new equipment were conducted, and shipments of coal for Government use inspected. Twenty pieces of electrical equipment were tested for the Navy. Small mine owners were told how to operate their properties safely and economically. New flow sheets that would improve the recovery and quality of the products were designed for ore-dressing establishments. Explosives were tested for safety at the request of State mine inspectors, mine operators, and manufacturers. In cooperation with the Tennessee Valley Authority, work was continued on the electric firing of a wide range of ceramics, including brick, china, and sanitary wares.

Important statistical information was supplied by Bureau of Mines economists. Monthly canvasses to show the domestic situation regarding five strategic minerals were undertaken at the urgent request of the Army and Navy Munitions Board, and only lack of funds and personnel prevented expansion of the series to cover all minerals on the strategic and critical lists. Services to the secondary-metals industries were expanded at their request. The last 5 reports of a series of 14 on mineral technology and output per man, prepared in cooperation with the Work Projects Administration, were completed; these discussed petroleum, bituminous-coal mechanization, gold placers, iron ore, and rock drilling. Inquiries from trade organizations and producers on the export coal trade were handled promptly. Lists of producers and buyers of minerals were furnished on request.

The Bureau of Mines endeavors to promote safety by accident prevention and improvement of working conditions and has issued the usual series of reports on mine accidents. Because falls of rock and coal cause a large proportion of all deaths in mines the Bureau has made searching tests to establish methods of detecting subaudible sound waves that precede collapse of mine pillars. Dust-prevention studies and complementary investigations of respiratory devices to be worn in dusty atmospheres are continuing problems of the Bureau. During the year X-ray methods for determining free silica were improved, and the safe handling of explosive dusts that may be used for fuel was studied.

The Bureau has also suggested the use of helium in cyclopropane anesthesia as a means of avoiding gas explosions in operating rooms and administration of helium-oxygen mixtures to avoid "ear-block" among caisson workers.

Ventilation is tremendously important to the efficiency of all workers. In 1940 the Bureau not only considered ways of determining and guarding against harmful dusts, as mentioned above, but checked the

efficiency of mine ventilation by analyzing 1,400 samples of mine air and gas.

Mechanized coal mining is being studied with special emphasis on safe operation of equipment. Permissibility tests of electrical apparatus for use in mechanized mines provide mine owners with rigid standards for safe operation.

To establish more definitely the cause of mine explosions, the Bureau during 1940 made 1,619 gallery tests to determine whether samples of explosives would ignite explosive air-gas mixtures, conducted 1,050 explosives-control tests, and studied the processes by which explosives ignite firedamp.

The Bureau's safety and health personnel and equipment continued to be on call in emergencies and were in their usual demand. At the request of the West Virginia Department of Mines a special course in rescue training was conducted for 481 applicants for coal-mine foremen's certificates. Bureau of Mines safety instructors completed the 100-percent first-aid training asked by 205 mineral establishments, assisted at 60 first-aid meets, and attended 790 safety meetings. During 1940, 93,878 persons were instructed in first aid and since 1910 first-aid and rescue courses totaling 1,361,465 have been given, including 986,467 to members of the coal industry alone.

Perhaps the most widely known features of Bureau of Mines safety work are its rescue and recovery operations after mine disasters, especially where lives are at stake. During 1940 Bureau engineers were asked to give assistance at or to investigate 18 mine explosions, 28 mine fires, and 78 miscellaneous accidents. Three of the explosions were major disasters, costing 191 lives in all; these catastrophes were all the more shocking because they followed a fiscal year in which not 1 major disaster occurred. If the mines in which these 3 disasters took place had fully complied with the Bureau's recommendations on safety in operation, especially rock dusting, the loss of life would have been materially reduced.

FUTURE WORK

The preceding summary of Bureau of Mines activities for the past fiscal year proves that its threefold program of safety, conservation, and research has almost unlimited ramifications. During the coming year the Bureau, in addition to continuing or extending much of the work listed above, plans to undertake the following new projects, as far as its personnel and resources permit:

In the field of metallurgy a comprehensive program for the beneficiation of manganese ores has been planned with the objective of recover-

ing manganese from an entire ore body, including the low-grade material; work on the electrothermal reduction and distillation process for the production of metallic magnesium from magnesite will be continued and expanded, and emphasis will be placed upon the development of lightweight, corrosion-resistant magnesium alloys of adequate stiffness and strength and upon further studies of manganese alloys; electric-furnace smelting of complex ores; and tests of large-scale sonic flocculators for handling smelter dust and fume. Investigations of American resources of nonmetallic minerals and their beneficiation will endeavor to render the Nation more independent of foreign supplies of fluorspar, feldspar, talc, magnesite, clays, and graphite.

In addition to determining the physical and chemical properties of American coals with reference to their most efficient utilization as fuels and the production of gas, coke, and byproducts, it is hoped that attention can be given to the mining, preparation, and utilization of anthracite.

Economic studies will be adapted to current demands. It is desirable to improve studies of the competitive-fuel situation and to expand investigations of byproduct recovery from coking plants and the supply of and demand for byproducts of coal processing. If opportunity offers, the detailed record of production of metals in Western States by districts and mines will be completed, accident data enlarged to include more detailed statistics by causes, and accident statistics gathered on the petroleum and sand and gravel industries.

Orderly development of mineral resources would also be promoted if data were kept current on sources, production, consumption, and stocks of important minerals. This procedure will be followed during the year with regard to as many strategic and critical minerals as possible.

Expansion of Bureau of Mines work in Latin America will not only help to foster the mineral industries of these sister republics but doubtless will open new sources of supply for the United States.

In view of the fact that many new workers will be needed in industries producing supplies needed by the defense program, especial attention will be devoted to making working conditions safe and hygienic. The past year's black record as regards coal-mine explosions prompts the inevitable conclusion that training in accident prevention must be stressed if the mining industries are to retain the improvement they have shown during the first 30 years of the Bureau of Mines.

REVIEW OF THE YEAR'S WORK

The numerous and varied activities of the Bureau of Mines during the fiscal year 1940, though supervised from Washington by offices of the Technologic, Economics and Statistics, Health and Safety, and Administrative Branches, were conducted largely in the principal mining districts of the country and at the 14 experiment stations in the following list: Bartlesville, Okla.; Berkeley, Calif.; Boulder City, Nev.; College Park, Md.; Laramie, Wyo.; Minneapolis, Minn.; Norris, Tenn.; Pittsburgh, Pa.; Reno, Nev.; Rolla, Mo.; Salt Lake City, Utah; Seattle, Wash.; Tucson, Ariz.; and Tuscaloosa, Ala. Important features of the year's work have been summarized below by branches and the divisions that comprise them.

TECHNOLOGIC BRANCH

The function of the Technologic Branch is to conduct engineering and scientific research in the interest of the mineral industries. The branch comprises six divisions—Coal, Mining, Metallurgical, Petroleum and Natural Gas, Nonmetals, and Explosives—and the office of the principal mineralogist. The branch also has charge of the cooperative programs between the Bureau of Mines and corresponding Government organizations in several foreign countries.

Coal Division

Investigations of the Coal Division emphasized conservation of the Nation's best coals by improving the utility of those of lower rank. One study of this type involved tests of the coking characteristics of coals that have not hitherto been employed in byproduct ovens, including two from Washington State that may be used for making coke if an iron and steel industry should be established in the Pacific Northwest. In an effort to promote the use of coals whose ash melts at low temperature (which makes them undesirable for some purposes because they form troublesome clinker), a thorough investigation was made of the properties of ash; it has been found that such coals can be burned economically in large powdered-coal furnaces from which ash is removed in molten condition. Tests continued in Government power plants to develop stokers suitable for burning subbituminous coal and lignite in localities where these fuels are cheaper than higher-rank coals. Especial attention also was devoted to low-rank coals in the course of research on hydrogenation of coal to produce the liquid fuels that doubtless will be substituted for gasoline and oil derived from petroleum when resources of the latter become depleted.

Fuel-economy service.—The fuel-economy service section made power-plant surveys, fuel-efficiency tests, and acceptance tests of new equipment, thereby advising Federal agencies how to select and burn fuel efficiently.

Work on boiler feed-water conditioning increased more than 30 percent over that in the previous year; in consequence, efficiency was improved, maintenance cost reduced, and safety increased. Placing low-cost water-conditioning chemicals on the Government general schedule of supplies permitted savings where expensive "mystery" compounds have been used. Smoke-abatement research was continued.

Coal analyses and fuel inspection.—To maintain the quality of coal purchased for Government use, shipments are inspected constantly and samples collected for analysis. During 1940 more than 13,000 samples were received and analyzed in the various coal-analysis laboratories of the Bureau. Coal-sampling trucks visited more than 300 mines in 14 States for inspection of coal as it was loaded on railroad cars.

Use of fuels.—Recent increases in the size of steam generators, furnaces, and kilns and consequently increased rates of burning have made the properties of ash—often the predominant factor in limiting the capacity of equipment—important subjects of research. A new apparatus has been developed for accurate measurement of the absolute viscosity and density of coal-ash slags at various temperatures and in controlled atmospheres. Study of the relationships between composition, liquid temperature, viscosity, density, and other properties of coal-ash slags indicates that ultimately it may be possible to predict the viscosity-temperature curve of coal ash from its chemical analyses.

Carbonization of coal.—The carbonizing properties of five coals were investigated, and the coke, gas, tar, and oil produced were studied with regard to the chemical and petrographic composition of the coals. These tests indicate the maximum probable yield of such byproducts as toluol, benzol, and xylol from various coals. Moreover, they are important guides when untried coals are substituted in the byproduct-coking process. Low-volatile coals from the Pocahontas No. 3 bed and Pocahontas No. 4 bed, blended with three different high-volatile coals, were equally effective in increasing the strength of coke.

Tests of a coal-carbonizing power plant using subbituminous coal were completed.

Subbituminous coal and lignite.—Friability, slacking characteristics, and carbonizing properties of certain subbituminous coals of

the Denver region were determined and the results applied in research on their storage and use.

In cooperation with the University of North Dakota, large-scale laboratory tests of the use of high-pressure steam to remove moisture from lignite were made. The resultant increase in heating value justifies application of the process to the drying of lignite if it is subject to a freight rate of \$1.50 a ton or more. The process can be applied to small sizes of coal more advantageously than to large sizes.

Hydrogenation of coal.—Coals from Alabama, Indiana, Montana, North Dakota, Utah, West Virginia, and Wyoming were tested in the continuous hydrogenation plant to determine how readily they liquefy to produce gasoline and oil under industrial operating conditions.

The survey of the effect of rank and type of coal on its hydrogenation characteristics was continued. Coals gradually become more resistant to liquefaction by hydrogenation as their carbon content increases, and there is no sharp boundary between coals that give a high yield of oil and those that give a poor yield. The low-rank coals, although easily hydrogenated, appear to be more sensitive to operating conditions.

Experimental coal mine.—Tests to check results reported from abroad showed that finely pulverized salt is two to five times as effective as ground limestone in preventing the propagation of coal-dust explosions. However, salt cheap enough to be used in the necessary quantities absorbs much water from damp mine atmospheres and moreover is likely to cause rapid corrosion of metals. For these reasons, salt cannot be recommended as a substitute for stone dusts, in spite of its effectiveness.

An extended investigation of dusts prepared from coal tar, water-gas tar, and petroleum pitches that now are or may in future be pulverized for use as fuel showed that they are decidedly more inflammable and explosive than is pulverized high-volatile coal dust. Explosions of pitch dust in industry can, however, be forestalled by rigid adherence to the safety rules developed to cover the handling of pulverized coal.

Conclusions and recommendations.—The resources of the Coal Division barely permit it to keep pace with current demands. A defense emergency requiring greatly increased use of coal and its products would quickly increase the demand for investigations of certain phases of the use of coal, especially the manufacture of metallurgical coke and the substitution of poorer coals in less vital industries to release high-grade fuels for key activities. The present

research program of the Bureau, directed toward the most efficient utilization of the cheaper and more abundant varieties of coal, should be augmented in order to extend the life of the relatively limited resources of high-grade steam and coking coals. Provision also should be made for research on the mining, preparation, and utilization of anthracite.

Mining Division

During 1940 the work on certain problems concerning the mining and milling of metalliferous ores was recessed to permit assignment of mining engineers of the permanent staff of the Mining Division to the investigation of domestic deposits of strategic minerals, as authorized by Public, 117, Seventy-sixth Congress, first session. Plans had been formulated so carefully that it was possible to initiate exploration projects as soon as funds were appropriated; to complete the first year's projected program for sampling 10 deposits, involving surface trenching, test pitting, and diamond drilling; and to examine 163 additional deposits. Three deposits disclosed important quantities of strategic minerals, and there is reason for increased hope of self-sufficiency in an emergency as regards at least two of the seven principal minerals on the strategic list—mercury and antimony.

Progress continued in the development and application of methods for measuring pressures on rock pillars in mines; if successful, these will not only contribute materially to conservation of mineral resources by avoiding unnecessary waste but will promote safety. Other important results were attained from investigations of methods for controlling dust and noxious gases from blasting; of mine ventilation; and of the seismic effects of blasting operations upon structures.

Examination of strategic mineral deposits.—One hundred sixty-three deposits containing strategic minerals situated in 13 different States were examined and reports made concerning them. About 20 percent of the deposits chosen for examination would warrant some exploratory work and sampling if funds permitted. Those selected represented only a small proportion of the many hundreds reported and were determined on the basis of their comparative merit, measured by available data, as possible sources of appreciable quantities of strategic minerals in an emergency. The location of the 10 projects to which especial attention was given during the fiscal year 1940 and the metals sought is as follows: antimony—Yellow Pine, Idaho; chromium—Columbus, Mont., Casper, Wyo., and John Day, Oreg.; manganese—Port Angeles, Wash., and Philipsburg, Mont.; nickel—Bunkerville, Nev.; tin—Tinton, S. Dak., and Beaverhead, N. Mex.; and tungsten—Lovelock, Nev.

Metal mining and milling methods.—Investigations of methods and costs continued in nine Western States, and at the same time technical assistance was furnished, in the localities being studied, to prospectors and small-scale operators financially unable to employ competent engineers.

Metal-mining research.—Earlier laboratory investigations of sonic methods for determining pressures on rocks was followed during the past year by extensive mine tests, which give promise that such methods ultimately can be applied to practical solution of difficult problems in the recovery of ore and coal. Subaudible sound waves that precede actual failure of mine pillars have been detected by high amplification.

In the mine-scale laboratory at Mount Weather, Va., comprehensive tests on the use of stemming, blasting plugs, and wood safety primers were continued. Conclusions were not possible, but comparative results attained with several types of stemming supplied new information on the control of dust and noxious gases from blasting. Studies of dust prevention in rock drilling and tests of the comparative durability of alloy and straight carbon-drill-steel rods and detachable bits contributed new data that will be of practical use to metal-mine operators.

Nonmetal mining.—Rock-loading, haulage, and drilling tests were conducted at seven quarries. Tests using a scleroscope to measure the drillability of rocks lend hope that drillability indexes can be developed by laboratory methods.

The particle size and shape of concrete aggregates produced in current practice at 11 quarries were determined, and screening tests of products from different types of crushers were carried on to assist in reducing waste products from quarry operations. Analyses of data on seismic and mechanically induced vibrations in buildings provided an index of destructibility, and no vibrations from quarry blasting recorded in a great number of tests were as great as this index.

Coal mining.—Important phases of coal-mining practice were considered with a view to promoting improvement in methods that will conserve coal resources and promote safe operation. The current rapid increase in mechanization of mining operations has justified the Bureau in placing emphasis on problems related to underground transportation of coal and multiple-shift mechanized mining.

Mine ventilation.—A series of tests on fan-pipe ventilation was run under controlled mine conditions at Mount Weather; and new data having practical application to both metal and coal mines were obtained. Research on air-conditioning in mines was continued by both field investigations and analysis of voluminous literature. Both venti-

lation and air-conditioning are important from the conservation viewpoint, as they contribute to recovery of ore, that might otherwise be unminable, from great depths.

Electricity and machinery.—Investigation and explosion “permissibility” tests of electrical equipment resulted in approval of 38 machines as safe for use in gassy coal mines when properly installed and maintained in accordance with the standards promulgated in Bureau of Mines schedules. Cooperation with Navy Department engineers involved mechanical and explosion tests of 20 pieces of electrical equipment. Comparative tests of the explosive properties of aviation gasolines and “dope” solvents and thinners with petroleum ether were undertaken.

More than 350 persons witnessed laboratory demonstrations of means by which faulty electrical mining equipment and wiring may ignite gas-air mixtures.

Conclusions and recommendations.—The desirability of continuing the activities of the past year was demonstrated. Based upon the strategic minerals investigations of the past year it is apparent that, in the interest of preparedness, exploration and sampling projects should be greatly expanded. Increased technical field service to prospectors and small-scale mine operators is highly desirable to prevent wasteful and haphazard exploitation of mineral deposits.

Metallurgical Division

Transfer of the headquarters of the Metallurgical Division from the East to its new building in Salt Lake City, with adequate facilities and central location as regards metallurgical industries, considerably increased its opportunities for service and made possible more effective direction of the technical investigations.

Material success has attended work of the Bureau in developing processes for the recovery of strategic metals from low-grade or off-grade domestic ores. Laboratory results indicate that high-purity chromium metal can be obtained from off-grade chromite; an operating plant demonstrates that the electrolytic-manganese process can be used to produce pure manganese from low-grade ores; and experiments show that antimony, nickel, copper and platinum metals may be recovered from certain complex domestic ores by methods developed in the Metallurgical Division. Other tests show that some ferro-grade manganese concentrates can be produced by ore-dressing treatments of several low-grade ores and that most of the residual manganese can be utilized as an iron-rich product or recovered by the electrolytic process.

Metallurgical fundamentals.—In the continuing program of measurement of low-temperature specific heats and determination of the entropy of metallurgically important materials, original results were obtained on eight. A review of work in this field pertaining to inorganic substances has been prepared.

Calorimetric studies of the heat of hydration of various forms of calcium sulfate show some of the reasons for difficulties in manufacture and furnish a possible manufacturing-control method when adapted to plant conditions.

Studies of the diffusive separation of gases have been completed. These methods are especially adapted to the recovery of hydrogen from coke-oven, blast-furnace, refinery, and other gases.

Ferrous metallurgy.—A fundamental investigation indicates that ferrous sulfide exists mainly as a colloid in molten blast-furnace slag and that the sulfides of calcium and manganese are present both in the colloidal state and in solution in the silicate.

Tests of the effect of various added elements on the thermoelectric power of iron have resulted in the development of a practical method of employing this property to distinguish among different kinds of steel.

The magnetic apparatus utilized in studying slags and simple oxides has been found quite useful in investigating various alloys that experience internal changes.

The method of determining carbon in steel samples by measuring the magnetic saturation is capable of giving consistent results at high temperature, and a new apparatus for determining carbon magnetically appears to be satisfactory for control purposes.

Nonferrous metallurgy.—Several improvements in lead smelting and in sintering resulted from cooperative research. Modifications in one furnace produced a sevenfold reduction in barring requirements, and proper control of air supply in another permitted better operation and increased lead recovery in the bullion.

Tests in small laboratory equipment of an electrothermal reduction and distillation process for producing magnesium metal from magnesite have been completed, samples of refined metal produced, and data required to design a larger laboratory unit obtained. Large furnaces have been designed, equipment and supplies have been purchased, and many special parts for a large laboratory unit to test the process have been constructed.

Special analytical methods were developed, among them new methods for determining molybdenum, that have been introduced in several large commercial laboratories. The construction or continued operation of a number of precious metal milling plants has resulted from

successful solution of problems presented to the Bureau. A total of 11,718 analyses and tests were completed in conjunction with the strategic-minerals program.

Some success was achieved in the development of procedures for the flotation of oxidized copper ores.

Following preliminary investigations which proved that electrolytic manganese produced by the Bureau method would serve as the basic material for alloys with unique properties, considerable equipment was installed for the casting, forming, heat treatment, and testing of manganese alloys. Several series of manganese alloys with one or more of the following outstanding characteristics have been prepared and studied: Hardenability by heat treatment, corrosion resistance, high electrical resistance, high coefficient of expansion, high vibration-damping capacity, and suitability for high tensile strength die castings.

Refractory manganese ores from Idaho, Utah, South Dakota, Colorado, and Minnesota are being studied as to the possibility of treatment by matte smelting with sulfide ores of iron and copper.

Electrometallurgy.—Several important contributions in this field include the development of methods for the recovery of nickel, copper, and platinum metals from domestic nickel ores; for the electrolytic recovery of antimony from antimonial gold ores; for the manufacture of calcium boride; for the preparation of pure boric acid from colemanite; for the manufacture of pure calcium borate from raw colemanite ores; and for the production of high-purity electrolytic chromium from domestic chrome ores.

Electric-furnace tests show that domestic chromium ores can be smelted to produce acceptable chromium ferro-alloys.

Improvements in the Bureau's electrolytic-manganese process are constantly being made and applied to small-scale operations.

Dust settling.—In consequence of a comprehensive study of the kinetics of flocculation in the laboratory unit, it has been possible to increase the efficiency of the sound generator from 5 percent to 21 percent; it is expected to exceed 30 percent in the new generator being built for a large flocculating unit designed for performing practical tests in cooperation with two large manufacturers of dust-collecting equipment.

Ore dressing.—Successful plant installations based upon Bureau recommendations include three flotation plants now in operation in the Rosiclare (Ill.) district for the treatment of fluorspar ores and tailings and a concentration plant being constructed in the Birmingham (Ala.) district for the treatment of siliceous hematite ores by tabling differentially ground material.

Problems that have reached a successful conclusion include laboratory demonstration, followed by pilot-plant operations, showing the possibility of recovering one-third or more of the manganese as a ferro-grade product and most of the remainder as spiegel-grade material from black manganese ores of the Cuyuna range, Minn.; and pilot-plant tests of magnesite ores from Chewelah, Wash., showing that cationic flotation reagents can be used effectively to float silica and leave a high-grade magnesite.

Questions of timely interest that are receiving intensive study comprise preparation of concentrates of ferro grade from Utah, Nevada, and Idaho manganese ores.

Conclusions and recommendations.—Adoption by the industry of Bureau of Mines ore-dressing flow sheets and analytical procedures and development of many promising processes for the recovery of strategic metals from domestic ores demonstrate the usefulness of the current work of the Metallurgical Division.

Important projects that await additional facilities for their completion include pilot-plant investigation of the production of important strategic metals especially manganese and chromium; research on substitutes for tin; the development of light-weight, corrosion-resistant magnesium alloys with suitable stiffness and adequate strength; the study of electric-furnace smelting of complex ores; and the construction and testing of large-scale sonic flocculators.

Petroleum and Natural-Gas Division

The Petroleum and Natural-Gas Division devoted a large proportion of its personnel and funds during the year to the preparation of reports requested by other Federal agencies and consultant service to the Government. Two reports—one on petroleum production practices and the other on manufacture and use of petroleum products—were compiled for the Subcommittee on Petroleum Investigation of the House Committee on Interstate and Foreign Commerce. The authors brought up to date similar reports prepared for the same subcommittee in 1934. The index of the entire 2,170 printed pages of hearings before the subcommittee also was prepared by the division.

The history and trends of technologic developments in the petroleum industry were treated in four manuscripts written by the division for the National Resources Planning Board, and departmental reports were prepared on problems relating to national defense and conservation. Consulting services to other bureaus are exemplified by a study made for the Biological Survey of the cause and effect

of loss of control of an oil well drilled on a waterfowl refuge in Texas and technical information supplied to Army engineers concerning effects on petroleum operations of the construction of a dam and resulting inundation of oil-bearing lands in Oklahoma.

Production of petroleum and natural gas.—Energy relationships in oil and gas fields were studied to facilitate production of the greatest quantity of oil with the least expenditure of naturally occurring energy and minimum waste of oil and gas. Subsurface and surface samples of oil and gas mixtures were collected from flow systems of wells and analyzed; field tests were made with the Bureau of Mines-American Petroleum Institute pressure core barrel, and the operation of that instrument was improved; laboratory determinations of characteristics of hydrocarbon mixtures were continued; and studies were made of one of the older Oklahoma fields that helped to explain why many redrilling campaigns in similar areas have been successful.

Data on reservoir conditions in the Lance Creek oil field and in Naval Petroleum Reserve No. 3 were obtained with the aid of instruments and laboratory equipment of the Petroleum Experiment Station at Laramie, Wyo., for measuring temperatures and pressures in wells and for collecting and analyzing subsurface oil samples taken under pressure. Study of the important problem of well spacing was continued, and a review of Cutler's rule of well spacing was published. Methods of estimating oil and gas reserves in both sandstone and limestone fields were developed further, and a report was issued on reservoir characteristics of the Eunice (N. Mex.) oil field, which produces from a limestone reservoir.

Research was conducted on the function of water in production of oil and on mud fluids used for drilling oil wells; a bulletin dealing with methods of preventing and treating crude-oil emulsions was published; and study of methods of cleaning wells to increase their productivity was continued.

Safety in the petroleum industry.—As a result of work to which the State of Oklahoma contributed financial aid, reports were published on accidents in the petroleum industry during 1937 and on the hazards of mercury vapor in petroleum laboratories.

Natural gas.—Two studies were continued in cooperation with the American Gas Association. One deals with icelike substances, known as gas hydrates, which form in gas wells and pipe lines at temperatures considerably above the freezing point of water; the other is directed toward improvements in methods of gaging and controlling combination (oil-gas) wells. This work led to publication of data on the physical and chemical properties of hydrates formed from various pure hydrocarbon gases and their mixtures, a description of an appa-

ratus developed by the Bureau for investigating properties of liquids in the natural underground reservoirs from which oil and gas are produced, data obtained with that apparatus, and results of flow tests on wells. The Bureau of Mines device for determining compressibility of gases was improved.

Such work helps the natural-gas industry to prevent obstructions to flow of gas caused by formation of hydrates, to attain greater accuracy in measuring gas in high-pressure operations, to adopt better methods of gaging and controlling wells in "distillate"- or "condensate"-type fields that produce large volumes of gas with relatively small quantities of light hydrocarbon liquids, and to improve conservation in those fields.

Oil-field brines.—In Oklahoma, Kansas, and Illinois Bureau engineers studied the disposal of oil-field brines, which are harmful to fresh-water supplies, vegetation, and aquatic and other animal life. The Petroleum Division work in Illinois is aiding oil operators in this leading agricultural State where large quantities of brine are produced, and results of field investigations in eastern Kansas not only suggest efficient methods of disposal but are useful to operators in areas where supplies of surface water are inadequate for increasing recovery of oil by flooding. All of these field studies received financial support from the States in which the work was done.

Chemistry and refining of petroleum.—The refining industry was reviewed from the incoming crude petroleum to the finished products, and the types of petroleum found in Illinois, Arkansas, Louisiana, Oklahoma, and Kansas studied with special emphasis on relationships between characteristics of crude oils and geological environment. Several selected crude oils were analyzed and considered in detail.

A system of analysis for sulfur groups based upon investigations of the types of sulfur compounds in distillates from high-sulfur oils was devised and tested, and its limitations were defined. Oregon Basin (Wyo.) gasoline and kerosene distillates were extracted with liquid sulfur dioxide at various temperatures and solvent-to-oil ratios, and research to determine the types of sulfur compounds in the distillates is progressing.

Asphalts of different consistency, prepared in the laboratory from seven crude oils from Wyoming, three from Arkansas, one from California, and one from Mexico, were subjected to common asphalt tests, and the properties of a 100-penetration asphalt from each crude oil were estimated from these data so that the properties of asphalts from different crude oils may be compared. Moreover, the asphalts were separated by solvents into such constituents as asphaltenes, resins, oils, and waxes.

Helium production.—The Amarillo helium plant produced nearly 9,500,000 cubic feet of salable helium during the fiscal year 1940, or about 50 percent more than in 1939. Approximately 84 percent of the output was supplied to the Government, and the other 16 percent was sold for medical, scientific, and commercial use. More than 450 stations of the Weather Bureau now use helium in meteorological balloons, and estimates indicate that the helium sold for medical use provided at least 34,000 hours of treatment. Figures compiled by the Bureau show that the Amarillo plant has produced 100,012,000 cubic feet of helium during its operating life of a little more than 11 years. Even this production is less than 50 percent of the potential output for an equal period if the plant were run at its rated capacity.

In October 1939 the Bureau completed a new gas well in the Cliffside field; it now has the highest producing capacity of the five wells that supply the helium plant.

Conclusions and recommendations.—As the facilities and qualifications of the Petroleum and Natural-Gas Division have become better known, other Government agencies have called upon its staff for technical assistance with increasing frequency. These requests for special services, especially during the past fiscal year, have hindered members of the division from performing their regular duties; the needs of other Government bureaus for such assistance should receive recognition in the form of increased technical personnel to relieve the burden now placed on the present corps of engineers.

Nonmetals Division

The highest grades of many nonmetallic minerals, such as fluorspar, talc, graphite, magnesite, and clays, usually are imported from abroad. World conditions already have sharply decreased the availability of some of these minerals, and nearly all are subject to curtailment. The Nonmetals Division is employing an increased proportion of its facilities in application of the newer ore-dressing methods to domestic materials in order that satisfactory grades may be produced in this country and the United States rendered more independent of foreign supplies. Methods used are mainly electrostatic and wet filming, such as froth flotation, table agglomeration, and the "sticky surface" process. Greatest effort has been expended on fluorite concentration because of the critical state of fluorspar supplies.

American materials for sanitary wares.—Continued studies at Norris, Tenn., have indicated that almost any variety of working properties can be developed from domestic clays, including the numerous types of kaolin and of ball clay. North Carolina alaskite was found to represent a satisfactory and potentially enormous source of white-

firing, mixed potash-and-soda feldspars to replace Cornwall stone from England.

Flotative and agglomerate concentration of feldspars.—Formal publication of the joint work of the Tuscaloosa (Ala.) and College Park, Md., stations with the aid of a cooperating company was released during the fiscal year. This technique for nonmetallic-mineral separation is novel and of great importance to the domestic feldspar industry, which is in urgent need of an efficient method for recovering feldspar of highest ceramic grade. A second feldspar company to apply the method on a commercial scale is now installing at Erwin, Tenn., a plant based upon the Bureau's suggestions. Feldspars from numerous areas have been tested in the laboratory to determine their response to this treatment, and the results have been very encouraging.

Coal.—Work on the preparation of coal was continued at Seattle, Wash., and Tuscaloosa, Ala., to determine the feasibility of reducing the percentage of ash-forming constituents and cutting down wastes in the coal industry. Recovery of coal from washery sludges and purification of wash water also have been given serious attention. All this research is working toward coal conservation and the maintenance of quality, which is of special importance in a defense emergency.

Utilization of coal wastes (consisting of bony coal, shale, slates, and clays removed from the coal during washing) has been studied, and experiments have been conducted on possible use of the powdered black material for soil conditioning to cause less reflection of heat rays onto crops that are easily burned, greater heating of the soil to accelerate growth (especially in cool weather), and other effects. The assistance of agricultural experiment stations, growers, and other State and Federal agencies has been enlisted in this program.

Optical investigations.—Some useful innovations in apparatus and operating technique have resulted during the year from the work in the petrographic, spectrographic, and X-ray laboratories of the College Park (Md.) and Tuscaloosa (Ala.) stations. Improved methods for obtaining a standard source of light for the spectrograph and higher accuracy in quantitative estimation of alkali metals in nonmetallic-mineral products are reported.

Clay investigations.—Because of the numerous uses to which clays are put and because of the many kinds of clay available, selection of a particular clay as best-fitted for a specific use is not easy. Selection usually is based upon special tests, which are legion; a study is being made to codify these test methods to make them more systematic, as well as more readily applied. A short syllabus and an unabridged one will be published. These will be helpful to the operator of any clay deposit in testing his own clay for its applicability in broader markets than he now reaches.

Electrically heated ceramic kilns.—Continuation of cooperative studies with the Tennessee Valley Authority at Norris, Tenn., has shown that excellent firing conditions can be maintained in electric kilns for face and common brick, fine and common china, and complicated sanitary wares, indicating a wider possible use of newly developed hydroelectric power throughout the country and conservation of fuels. Employment of short, rapidly fired, small-section, multiple-tunnel kilns will greatly reduce the difference in total cost of firing between electrically heated and the fuel-fired kilns in use at present. Both graphite and silicon carbide rods are being used as heating elements.

Prevention of china-plate warpage.—The causes of warpage in china plates have been studied at Norris, Tenn., in cooperation with the Tennessee Valley Authority. It has been found that unglazed china plates that have warped in the first firing can be straightened by nesting in machined, refractory rings in a second firing.

Embrittlement of boiler steel.—Cooperative investigation of the mechanism and means of preventing the intercrystalline cracking or embrittlement of boiler steel was continued at College Park, Md. Special emphasis was placed on the installation of embrittlement detectors on 200 stationary and locomotive boilers and on the collection of data from logs of the operating performance. Greater safety, longer runs, and longer life of boilers are now assured. Methods were improved for evaluation of the true caustic alkali content of numerous commercial boiler waters, and a more rational correlation of cracking and solution composition was developed.

Critical attention was given to checking the value of sodium sulfate, commonly used to prevent this caustic embrittlement, and to searching for other more effective organic or inorganic compounds. Certain tannin-containing materials, such as quebracho, waste sulfate liquors, and similar products, still appear to offer the best means of preventing the cracking of boiler steels.

Refractory raw materials.—Work was continued on certain phases of the beneficiation and utilization of olivine and kyanite in refractories, molding sands, and special fused products. Reviews of investigations on olivine were published, and a general report on kyanite is being prepared. Electrically fused olivine may prove to be an acceptable substitute for imported magnesite for superrefractories. Raw olivine has been used as a replacement for magnesite in parts of steel furnaces.

Diatomite.—Research on the properties and methods for utilizing Pacific Northwest diatomites was continued, and information on methods for treating Maryland diatomites was published. Reasonable assurance of the ultimate development of commercial production of

high-grade diatomaceous earth from these eastern clay-diatomite deposits is indicated.

Subsieve particle-size analysis.—Numerous fine powders have been subjected to particle-size determination in the subsieve range by means of the roller analyzer. Limitations and means for improving the method were studied and a critical comparison was made with other apparatus and methods for particle-size evaluation.

Conclusions and recommendations.—Because of the serious dislocation of world trade by the European war, an increasing proportion of the work of the Nonmetals Division will be diverted to mineral emergency problems and older investigations brought to convenient end points or recessed.

Explosives Division

The major objectives of the Explosives Division are the conservation of life and mineral resources by conducting research and tests pertaining to the development and safe use of explosives, and the explosibility of gases and vapors.

Testing of explosives.—The Explosives Division made 1,619 gallery tests to determine whether or not given samples of explosives would ignite explosive air-gas mixtures or explosive mixtures of coal dust, gas, and air, and also completed 1,051 other explosives-control tests of a physical nature. In the chemical laboratory, 92 analyses were made. During the year five explosives were submitted for "permissibility" tests to determine whether or not they could be used with safety in gassy or dusty coal mines under conditions prescribed by the Bureau. Two of these failed to pass the gallery tests; of the three that met the requirements, only one was placed on the active list.

Mechanism of ignition of firedamp by explosives.—Experimental and theoretical research into the processes by which explosives may ignite firedamp and so initiate serious mine disasters was continued. The results have emphasized the importance of controlling the energy content of the issuing detonation products. The flow condition under which the products mix with and communicate this energy also appears to be outstanding. The study is continuing to guide the development of safer explosives.

Sheathed explosives.—The Bureau has encouraged industry to submit sheathed explosives for examination and testing. A simple procedure for evaluating the increased safety imparted by the sheath when used on a "permissible" explosive has been adopted, and information to aid further development and economical application obtained.

Poisonous gases from explosives.—Testing-station studies have emphasized the increased hazards from poisoning that may result

when carbonaceous blasting plugs or carbonaceous primers are used in the explosives assembly.

Cushioned blasting.—A review of available information on cushioned blasting has shown it to be quite conflicting and has demonstrated the need of experimental information for clarification and development. The experimental study is under way.

Gas explosions.—A procedure for eliminating gas explosions induced by oxygen-cyclopropane mixtures during anesthesia has been developed. Helium is used to replace a portion of the oxygen and has proved very successful because of its high thermal conductivity, good flame-quenching properties, and ease of inspiration.

The limits of inflammability of five combustibles and the minimum ignition temperatures of six combustible vapors have been determined. It has been shown that marked improvement in the ventilation of underground space for the elimination of gas hazards can be obtained when two ducts, one near the bottom and one near the top, are used. Natural differential thermal effects probably are utilized.

Mine fires.—A method has been developed for estimating the amount of heating or oxidation of a stored anthracite from the standard analysis of the stored coal.

Attempts to follow changing underground fire conditions from carbon monoxide analyses have shown that certain bacteria consume carbon monoxide and hydrogen so rapidly as to render such analyses of doubtful value.

Hazards in the use of Diesel mine locomotives.—An investigation of the composition of exhaust gases from Diesel engines has led to recommendations for safe ventilation practices where these engines may be used and have indicated the significance of such analyses in following combustion phenomena in the engine.

Conclusions and recommendations.—The Explosives Division needs to enlarge its staff to keep abreast of the requests being made by State mine inspectors, mine operators, and manufacturers of explosives for investigation of the safety and suitability of new explosives.

Principal Mineralogist

The interest of the public in the search for strategic and critical minerals largely explained the increase of 1,500 in the number of specimens submitted to the principal mineralogist for identification as compared with the 2 preceding years. The total samples received—3,500—was so large that the laboratory staff had to be enlarged to handle the increased volume of work.

ECONOMICS AND STATISTICS BRANCH

The Economics and Statistics Branch contributed to the Government's defense program by supplying factual information on sources, production, consumption, and stocks of strategic minerals for the Army and Navy Munitions Board and the Advisory Commission to the Council of National Defense. Its normal activities comprised the collection, review, and publication of data on all principal mineral commodities; research on special economic subjects; and compilation of the annual statistical survey, *Minerals Yearbook*. The branch comprised the Coal Economics, Petroleum Economics, Mineral Production and Economics, Metal Economics, Nonmetal Economics, and Foreign Minerals Divisions.

Coal Economics Division

After the outbreak of the European war the Coal Economics Division received numerous requests from coal-trade associations and coal exporters for statistical data and interpretive material on foreign commerce in coal, with special reference to the possibility of expanding the coal-export trade of the United States. It continued to cooperate with the Bituminous Coal Division of the United States Department of the Interior and helped to prepare a joint study on mechanized mining. The Coal Economics Division also maintained contact with the Secretary of the Canadian Fuel Board.

Annual reports.—The anthracite and coke sections completed their annual statistical studies of the anthracite, lignite, and coke industries; the results, with corresponding data on fuel briquets, packaged fuel, and peat, largely form the basis for the division's chapters in *Minerals Yearbook* covering production, distribution, and consumption of these fuels. In the Anthracite chapter further attention was given to the distribution of that commodity and to a statistical analysis of the competitive-fuel situation in the principal anthracite-consuming States.

Monthly and weekly reports.—Monthly reports included preliminary data on the production of anthracite and of beehive coke, and soon after the first of any year supplements supply preliminary statistics concerning these fuels for the preceding year. A weekly report states the estimated current weekly production of anthracite and of beehive coke, and one issue each month summarizes developments in the Pennsylvania anthracite industry during the previous month. Special articles were prepared by the international coal trade section for the monthly publication, *International Coal Trade*, including the Competitive Fuel Situation in Ontario and Quebec; Fuel and Power in Canada, 1915-18, 1928, and 1938; Britain's Coal

in War Time; Germany's Coal in War Time; Fuel and Power in Uruguay; and Fuel and Power in Chile.

Since July 1939 a table has appeared in each issue of International Coal Trade that shows (monthly and for the year to date in comparison with corresponding periods of the preceding year) the approximate coal, petroleum, natural gas, and hydroelectricity available for consumption in the United States in their own units of measurement and in terms of coal. Similar data on Canada are shown in a subjoined table. These two countries probably produce 90 percent of the fuel (except wood) and power available in all the Americas.

Correspondence and inquiries.—The international coal trade section devoted an unusually large proportion of its time after hostilities began abroad to answering correspondence and other inquiries about the export coal trade. In addition to the reports on foreign aspects of the coal industry, the section also prepared several special articles at the request of various United States and British coal-trade journals.

Conclusions.—The Coal Economics Division purposes to improve its studies on the competitive-fuel situation and to investigate the economics of byproduct recovery from coking plants and of the supply of and demand for the byproducts of coal processing.

The division's research on the recovery of anthracite from refuse piles and rivers, the progress of strip mining, and the increasing importance of the fuel-briquets and packaged-fuel industries that prepare from fine coal a product having the characteristics of lump coal all measure the results of industrial processes that tend to conserve the Nation's fuel resources and make it more self-sufficient in an emergency.

Petroleum Economics Division

The Petroleum Economics Division collects statistics and makes economic studies of the output and consumption of petroleum and natural gas and their products for the information of Federal and State agencies and of the industry. The scope of this work is such that the oil industry probably is supplied with more comprehensive and current information than is available to any other major enterprise. The division maintains a field office at Los Angeles for collection of California data and another at Bartlesville, Okla., for contact with State agencies and for assembly of information on natural gas.

Forecasts of demand.—The division has issued monthly forecasts of the demand for motor fuel and for crude petroleum by States

of origin since July 1935. This information is of outstanding interest to State conservation agencies in connection with proration programs to avoid waste and prevent the uneconomic accumulation of oil in storage. Improvements in forecasting methods have resulted in attainment of a degree of accuracy that has made the forecasts a reliable guide to the trend of operations in the industry.

International studies.—Data on the trends of world production of oil, international trade, and world consumption have been issued regularly in monthly reports and data on world prices in quarterly reports. These publications have been of especial use since the disruption of world trade by the European war.

Special investigations.—The annual survey of sales of fuel oil, range oil, and kerosene, by States, represents a worth-while contribution to information on the domestic use and regional distribution of oil products. The early issue (in June 1940) of the annual list of petroleum refineries, showing their situation and capacity, has been of exceptional timeliness under existing conditions. A special survey of aviation gasoline was inaugurated in October 1939 to cover production, stocks, and domestic demand on a monthly basis. Two economic papers prepared by the division were issued during the year. Economic Paper 20 made available unpublished statistics of detailed operations, by refinery districts; and Economic Paper 21 discussed the trends and seasonal variations in factors influencing domestic motor-fuel demand on a monthly basis.

Mineral Production and Economics Division

The Mineral Production and Economics Division collected mine-production statistics for gold, silver, copper, lead, and zinc in the United States; supervised preparation of the annual volume—*Minerals Yearbook*; assembled and interpreted statistics on employment, accidents, and explosives as related to the mining industries; and concluded the Bureau of Mines—Work Projects Administration cooperative study of changes in mineral technology with regard to their effect on output per man. Early in the year the chief of the division was transferred to the United States Department of Commerce to conduct the census of mines and quarries, and members of the division have cooperated closely in this work.

Metal-mine statistics.—Preliminary reviews of metal mining in the 13 Western States that produced nonferrous metals in 1939 were released early in January 1940, and recapitulations summarizing the mine production of gold, silver, copper, lead, and zinc were distributed soon afterward. Final detailed statistics for all metal-mining States were completed by the middle of June. During the year compilation

of the historical record of metal mining in the Western States continued to progress.

Minerals Yearbook, 1939, was issued in September 1939. The total circulation of this volume was about 9,000 copies, and the sales edition was virtually exhausted before the close of the fiscal year. For the past 2 years, about two-thirds of the chapters have been printed separately; however, this advance distribution evidently has not reduced sales of the bound volume.

Employment and accidents.—To supply mining companies and safety engineers with uniform, comparable data that state the number and causes of accidents and the number of men employed in the principal branches of the mining industry, the division continued its annual statistical surveys of mines, quarries, and related establishments.

Rivalry in operating without accidents was stimulated by contests and the award of trophies to mining and sand and gravel companies that achieved the most outstanding safety records. The winners were determined by statistical analysis of reports on accidents and man-hours of exposure to mining hazards submitted by the companies participating.

The annual statistical survey of the production of explosives in the United States was based upon reports from manufacturing companies and showed the quantity used for mining and for other industrial purposes.

Changes in mineral technology and output per man.—The division concluded its cooperative study with the Work Projects Administration of technologic changes and output per man in selected mineral industries in the United States. Reports on petroleum, bituminous-coal mechanization, gold placers, iron ore, and progress in rock drilling either were released or were ready for printing at the end of the year, raising to 14 the total of reports completed in connection with the cooperative program. The Bureau of Mines will publish a report on gypsum based upon an investigation of this series. Two other manuscripts—on lead and zinc and on anthracite—have not been completed in final form, but may be prepared for publication later.

Conclusions and recommendations.—Moderate expansion of the personnel and functions of the division would make possible material improvement in service to the mining industries. The field officers should be enabled to complete compilation of the detailed record of metal mining by districts and individual mines, as well as to inaugurate quarterly surveys of metal-mine output. The work on accident statistics should include detailed interpretation by causes,

and a careful analysis thereof should be brought to the attention of the operators. Furthermore, the scope of accident statistics should be expanded to include the petroleum and sand and gravel industries. Ability to meet increasing demands for information depends directly on the extent to which these deficiencies are rectified.

Metal Economics Division

Accelerated activity with regard to strategic minerals was the chief interest of the Metal Economics Division, particularly after declaration of the emergency.

National defense.—The head of the division served as a member of the Mineral Advisory Committee to the Army and Navy Munitions Board, and other specialists in the division advised military service and procurement agencies in connection with the Government stock-piling program. The Army and Navy Munitions Board requested the division to inaugurate special monthly canvasses on the production, consumption, and stocks of strategic and critical metallic raw materials. Owing to shortage of personnel the division was unable to comply fully with the request; but monthly surveys of the five most important strategic minerals were undertaken, and the results of these studies have been invaluable to the service agencies in planning national defense. For the first time current data have been developed on the domestic position of these indispensable but deficient raw materials. This information also is of use in connection with conservation, for planning orderly development of domestic resources.

The division prepared special reports in answer to a greatly increased number of requests for information, particularly on strategic minerals, from the Congress, other Government agencies, industry, and the public.

The experienced personnel and the data files of the Metal Economics Division were placed at the disposal of the Advisory Commission to the Council of National Defense early in June 1940. For 2 months the consultant on minerals of the Commission maintained headquarters in the division and was assisted by its staff in organizing the work on minerals.

Secondary metals.—The secondary metals section, stationed at Pittsburgh, expanded its activities during the year. In addition to the annual canvass on consumption of iron and steel scrap there was inaugurated, at the request of and in cooperation with industry, a series of quarterly reports on consumption and stocks of iron and steel scrap. These basic data, which had not been available before, proved extremely helpful to other Government agencies and to indus-

try in connection with the recurring demand for licensing exports of this material.

Another feature of this section's work was the complete revision, after detailed study, of the method of collecting and presenting basic data on nonferrous scrap. In addition to the service rendered industry in general and the scrap-metal trade in particular the enlarged activities in both ferrous and nonferrous scrap are vitally important to the service agencies in matters of national defense. As every pound of scrap metal recovered and reused eliminates the necessity of extracting and processing a pound of virgin metal the conservation aspects of scrap utilization are immediately apparent.

Other services.—During the fiscal year 1940 the Metal Economics Division conducted an increased number of statistical canvasses, prepared 116 manuscripts for publication, and answered 3,500 requests for information.

Conclusions and recommendations.—The present emergency has demonstrated the wisdom of previous recommendations concerning the collection of consumption and stock data on such important strategic metals as manganese, chromium, tin, tungsten, and mercury. These data are vital in formulating plans for industrial mobilization in an emergency and should not only be kept currently available but should be expanded to include all strategic and critical metals and continued up to date even after the present crisis has terminated. Adequate statistics are now available on production, shipments, and producers' stocks of the more important metals, but reliable records of actual consumption and the balance of supply and demand are not known because of lack of information on consumers' inventories. These deficiencies could be supplied by a moderate increase of the staff.

Nonmetal Economics Division

To the normal duties of the Nonmetal Economics Division—collection of statistics and economic data and dissemination of marketing information on nonmetals—were added various strategic-mineral assignments and many phases of defense work involving direct service to the Army and Navy Munitions Board, the National Defense Commission, and the Procurement Division. Moreover, increased information was demanded by prospective producers and consumers of products affected or likely to be affected by war developments.

National defense.—Stocks on hand, current and estimated future requirements, and other data necessary to perfect military procurement plans were ascertained in respect to industrial diamonds, asbestos, graphite, mica, and quartz crystals. Special studies were made of other commodities necessary to a military program (such as iodine, magnesium compounds, fertilizers, refractories, and abrasives)

and also such specialties as crucible clays, pencil clays, and grinding pebbles that formerly were imported but now must be obtained from domestic sources.

Publications.—Each year the division prepares the annual reviews of more than 115 groups of nonmetals and 20 rare metals that comprise 19 chapters of Minerals Yearbook. A comprehensive résumé of the nonmetallic-mineral industries during 1939 was published in March, and current statistics and other information were released in 54 mimeographed reports and magazine articles. Material for more than 170 pages of Mineral Trade Notes was compiled in the division. A graphic survey of the lime industry, a review of the potash situation, and a joint report with the Foreign Minerals Division covering the cement industries of Latin America were published during the year. Eight papers were written for trade journals or to be used as public addresses; one lecture outlining the importance of minerals and the need for conserving them by more efficient use was issued later as Bureau of Mines Information Circular 7118, *More Jobs for Minerals*.

Other services.—In addition to tabulating nearly 22,000 questionnaires the division answered 4,500 inquiries from other Government agencies and from the public and distributed 176 lists of producers and 1,242 lists of buyers during the fiscal year.

Conclusions and recommendations.—Of 170 items on a recent list of subjects handled by the Bureau of Mines, the Nonmetal Economics Division is responsible for economic and statistical information on 84. The chief engineer alone is the nominal specialist for 38 of these and the assistant chief engineer for 23; actually the number of items they handle is several times as large as their nominal assignments, which cover major subjects without specifying many of their ramifications. Obviously, it is impossible to keep pace with all developments in so many fields and fulfill administrative duties as well. War-preparedness activities have brought added responsibilities, and unfortunately this program is concentrated upon items for which no other specialists have been developed. Additional technically trained specialists are badly needed, and more high-grade clerical assistance is imperative to check work done under high pressure.

Foreign Minerals Division

Effects of European war.—Economic information on world output, consumption, and movement of mineral raw materials became subject to official censorship during the last three quarters of the fiscal year, and 18 countries suspended publication of official production and foreign trade statistics—a fact that indicates the strategic and military value belligerents place on such data. The difficulties experienced in consequence of wartime restrictions on distribution of

official statistics have, however, resulted in closer cooperation between the Bureau's Foreign Minerals Division and the United States Department of State. More extensive research by the division staff has also been necessary to obtain material for Minerals Yearbook.

Foreign mineral specialist.—As a practical demonstration of the President's "Good Neighbor" policy, the Bureau of Mines foreign mineral specialist was assigned to Latin America in May 1939 after several years' duty in Europe. During the past year he prepared economic surveys of the mineral resources, production, and trade of Bolivia, Peru, Chile, and Argentina for publication in the Foreign Minerals Quarterly. The assistance of the foreign mineral specialist to the procurement agencies of the United States Government became more pronounced as war spread in Europe, cutting off normal sources of mineral supply. Availability in South America of several outstanding strategic minerals, including tin, tungsten, chromite, antimony, manganese, and mica, coupled with the fact that more extensive development of these resources may (to the mutual advantage of all countries concerned) reduce our present dependence on countries and their colonial possessions now involved in the conflict, justifies this expansion of Bureau of Mines activities in Latin America. Toward this end funds have been requested of Congress to supplement those allotted in appropriations for the fiscal year 1941 to enable the Bureau to cooperate with certain South American countries.

HEALTH AND SAFETY BRANCH

The Health and Safety Branch, which comprises the Health Division and the Safety Division, studied conditions that affect the health of workers in the mineral industries, conducted safety-training courses, and answered emergency calls for assistance after catastrophes at mines and mineral plants.

Health Division

The Health Division continued its efforts to improve hygienic conditions in the mineral industries in order to maintain health and increase efficiency and morale, thus conserving the productivity of American workers, a resource indispensable to national defense. Studies pertinent to the safe use of Diesel locomotives underground were undertaken; respirators and gas masks were tested and approved; information important in alleviating compressed-air illness was obtained; an X-ray method for determining free silica was developed; several health surveys were made; and control measures were recommended.

Gas analysis.—Approximately 1,400 air or gas samples were analyzed to ascertain efficiency of ventilation, to determine possible hazards from methane and other gases evolved from mine strata, and to

discover the nature of gases from blasting and mine fires and following mine explosions.

Compressed-air illness.—A report dealing with the use of respiratory protective devices under pressure was published. Two publications, one on the use of helium-oxygen mixtures to prevent "ear-block" and one on the administration of oxygen during decompression to prevent compressed-air illness, are in press.

Diesel exhaust gas.—A report was issued on the composition of exhaust gas from Diesel engines when operating in proper mechanical condition; other reports are being prepared. The data are essential in establishing regulations for the safe use of Diesel locomotives underground; this work is being continued in cooperation with the Explosives Division.

Respiratory protective devices.—The continued heavy demand for lists of approved respiratory protective devices is evidence of the importance attached to this work. Seventeen approvals covering various types of such devices were granted during the year, the second largest number approved in any one 12-month period.

Dust studies.—The composition and concentration of dust and fume in the air of a zinc smelter were ascertained and measures for improvement recommended. The concentration of dust in the air caused by dumping parcel-post packages from sacks and sorting was found to be below the probable permissible limit. The X-ray and spectrographic procedures for analyzing samples of dust from the air were improved further. An X-ray method for determining free silica was developed that has advantages over existing methods. More information was obtained on operating characteristics of the impinger and the electric precipitator, devices for collecting dust from the air.

Conclusions and recommendations.—The national defense program necessitates rapid expansion of industrial activities, which will increase existing hazards and introduce many new ones in the mineral industries as well as in many other types of work. Safe, hygienic working conditions must be provided if inefficiency and delays are to be avoided; therefore, it is necessary to give earnest consideration to possible effects on health and safety when existing operations are expanded or new ones introduced.

The Health Division of the Bureau of Mines comprises 18 persons, manifestly an inadequate staff to handle the multiplicity of health problems pertaining to the welfare and efficiency of the million or more workers in the mineral industries. The personnel of this group should therefore be increased severalfold to cope with the numerous problems certain to arise when the national defense program gets definitely under way.

Safety Division

Safety Division engineers trained members of the mining industries in first-aid and mine rescue; responded to emergency calls for assistance after mine fires and explosions; inspected mines to discover unsafe conditions and made reports thereon to mine operators; and attended safety meetings and first-aid competitions.

Personnel.—The personnel of the Safety Division included 32 engineers, 29 safety instructors, 20 clerks, and 7 other employees, a total of 88 persons. These were on duty in various mining States, with headquarters at 20 cities, representing 15 States and Alaska.

Training courses.—In the fiscal year 1940 the Safety Division trained 93,878 members of the mining and allied industries in first aid and mine rescue. The work was conducted in 965 cities in 41 States. In 1939, 120,733 persons were trained and in 1938, 105,093. Since inception of the Bureau in 1910, the total number of Bureau of Mines first-aid and mine rescue courses completed has been 1,361,465, distributed among the several branches of mining as follows: Coal mining, 986,467; metal mining, 149,661; petroleum industry, 108,362; metallurgical plants, 34,416; nonmetallic mining, 22,398; cement plants, 14,125; tunnel work, 7,256; and miscellaneous mining activities, 38,780.

Those who work for the Safety Division in the field (about 60 in all) ordinarily meet over 300,000 persons in the mining industries annually and relay to them the Bureau's safety experience and teaching. Only 2 of the 7 all-steel mine safety cars were in active use; 62 passenger automobiles and automotive trucks were operated and traveled 913,839 miles, to which should be added 20,024 miles of travel by employees in personally owned automobiles.

Mine fires and explosions.—During the year 18 mine explosions, in 12 States, and 28 mine fires, in 11 States, were investigated, and the Safety Division personnel aided in rescue and recovery work at virtually all of them where life was involved. Deaths in mine explosions totaled 206, including 191 in 3 major disasters—a sad contrast to the fiscal year 1939, when there was not 1 major fire or explosion disaster in any mine in the United States; this meant that in 1939 no single explosion or mine fire cost 5 or more lives.

In spite of the bad record for 1940, safety practices recommended by the Bureau have improved mining conditions. One of these practices is rock dusting, which is known to retard the spread of explosions; if the three mines that suffered the most serious disasters in 1940 had fully complied with the Bureau's recommendations on safety in operation, especially rock dusting, the death lists would have been much smaller.

The Safety Division investigated 79 miscellaneous accidents in 25 States (including those from roof falls, explosives, electricity, and other causes) and numerous surface explosions of black powder, dynamite, pulverized fuel, and gas.

Mine reports.—Two hundred and sixty-one reports on safety conditions at individual mines or plants in 34 States were made during the year; some were transmitted to the operating company, with constructive criticism of existing conditions and definite recommendations for improvement. In consequence of these reports and the verbal suggestions by Bureau men during or after the inspections upon which they were based, operators made hundreds of important alterations in equipment, methods, and practices and safety in mines was increased thereby. Many such changes have been reported by field men, and several hundred letters were received during the year from mining people expressing their appreciation of these and other services.

Other activities.—During the past year, 1,425 persons in 24 States were qualified to teach first-aid courses and earned provisional or final first-aid instructors' certificates, raising the total to 13,287 issued in 45 States since 1930. Most of these first-aid instructors would be available and fully prepared to give first-aid training to both military units and civilians in a war emergency.

Certificates of 100-percent first-aid training were issued in 17 States to 205 mines or plants wherein every person had completed the Bureau of Mines first-aid course; to June 30, 1940, these certificates of 100-percent first-aid training had been issued to 2,520 mines and plants; on an average, 229 per year of these 100-percent first-aid certificates have been issued for the past 6 years.

Ninety-seven expert mine rescue men completed the Bureau of Mines standard course in rescue and recovery operations and earned certificates, raising the total to 3,378. In addition to full training in the advanced rescue and recovery course, a special course in mine rescue training was given to 481 applicants for coal-mine foremen's certificates in West Virginia, at the request of the chief of the State department of mines. The Bureau's accident-prevention course for higher officials in coal mining was completed by 205 men, and 336 others took part of the course; in all, 8,398 such certificates have been issued to mine officials in 16 States since 1930, and 5,057 others have studied part of the course.

Eleven new safety clubs (Holmes Safety Association chapters) were organized in 6 States; 488 of these mining-community organizations have been established, and 29 States are represented.

Special studies and reports covered a multitude of subjects, including rock dusting, ventilation, electricity, haulage, air conditioning,

wetting methods, detection of gases, testing roof, reducing air dustiness, and other health and safety problems.

The Safety Division assisted at 60 first-aid contests in 16 States and British Columbia; 6,636 persons participated in these contests. Twenty-four safety exhibits and demonstrations were prepared for 13 States; field engineers attended 790 safety meetings in 35 States; and 50 manuscripts were prepared for publication.

Conclusions and recommendations.—The services of the Safety Division in first aid and rescue training continue to be in demand. Because of the past year's unfortunate record as to mine explosions, however, more emphasis in future should be placed upon instruction in accident prevention. Experience at individual mines has proved that accidents can be eliminated if the entire mine organization, from officials to miners, whole-heartedly determines to prevent them.

ADMINISTRATIVE BRANCH

The Administrative Branch comprised the Information and Office Administration Divisions.

Information Division

The work of the Information Division included the editing and distribution of publications, supervision of motion-picture production and circulation, maintenance of the Bureau library, and preparation of exhibits.

Editorial.—During the fiscal year 12 bulletins, 17 technical papers, 2 miners' circulars, 2 economic papers, 69 chapters comprising Minerals Yearbook, 1940, 2 schedules, 1 annual list and index of publications, 12 monthly lists of publications, 1 motion-picture list, 1 revised handbook, and 2 miscellaneous publications were edited and sent to the printer—a total of 121 printed publications. Moreover, during the year 34 publications were prepared and sent for reprinting, including 1 bulletin, 3 technical papers, 21 Minerals Yearbook chapters, 7 miscellaneous publications, and 2 handbooks.

The editorial section also edited 71 reports of investigations and 47 information circulars, as well as 45 periodical, cooperative, and miscellaneous reports.

Printing funds permitted only part of the Bureau's output to be published at Government expense; consequently, 189 papers were prepared for the technical and trade press. The reports handled during the year—507 in all, compared with 483 in 1939—involved the editing of 26,650 pages of manuscript.

Publications.—During the fiscal year 146,800 copies of the free editions of Bureau publications and approximately 300,000 reports of investigations, information circulars, and monographs were distrib-

uted by the publications section. In addition, the Superintendent of Documents sold about 100,000 copies of the Bureau's printed reports.

Numerous brief statements announcing the issuance of new publications or describing current investigations were supplied to the daily and technical press.

About 75,000 letters requesting publications or information on the Bureau's activities were received.

Library.—The year's accessions to the library comprised 4,523 books, 380 periodicals were received currently, and 24,260 books and periodicals were loaned for use outside the library.

Motion-picture production.—To help disseminate information on safety and efficiency in the mineral industries, the Bureau maintains a library of educational motion-picture films believed to be the largest in the world. These films are prepared under the supervision of the Information Division, through cooperation of industrial concerns that bear the entire cost of production and of providing copies for loan by the Bureau. During the year 1,124 sets of new films, comprising 1,962 reels, were added to the library.

Motion-picture circulation.—Circulation of the Bureau's motion-picture films is centralized at the Pittsburgh (Pa.) Experiment Station, but there are 16 subdistributing centers for films throughout the country, selected with regard to accessibility. The films are loaned to schools, churches, civic and business clubs, miners' local unions and chapters of the Holmes Safety Association, and similar organizations. No charge is made for use, but exhibitors are asked to pay transportation charges. On June 30, 1940, the Bureau had 3,006 sets of films, including 5,499 reels and aggregating 2,456,000 feet. During the year films were shown on 101,350 occasions to an attendance of 8,584,000 persons.

Graphic services.—Graphic services, including drafting, photography, and multilithing, are also centralized at Pittsburgh. Over 1,300 drawings were prepared and over 30,000 prints of various types made.

Exhibits.—The Division prepared and installed 14 exhibits illustrating Bureau activities at expositions and conventions.

Office Administration Division

The Office Administration Division handles personnel matters, property records, accounting, multigraphing and mimeographing, and general administrative routine.

FINANCES

The total funds available to the Bureau of Mines for the fiscal year ending June 30, 1940, including direct appropriations, departmental allotments, reappropriated balances, and sums transferred from other departments for service work, were \$3,183,455.29. Of

this amount \$3,048,810.29 was spent, leaving an unexpended balance of \$134,645.00. On the regular work of the Bureau, \$2,945,361.06 was expended. These figures are subject to revision due to unpaid obligations.

Table 1 presents classified and complete information regarding the financial history of the Bureau since its establishment in 1910.

Table 2 gives a statement of the distribution of congressional appropriations to the branches and divisions and the expenditure of these funds in 1940 by Bureau divisions.

TABLE 1.—Bureau of Mines Appropriations and Expenditures, Fiscal Years Ended June 30, 1911-40

Fiscal year	Appropriated to Bureau of Mines	Departmental allotments ¹	Funds transferred from other departments ²	Total funds available for expenditure	Unexpended balances	Total expenditures	Expenditures, exclusive of service items ³
1911	\$502,200.00	\$34,200.00	-----	\$536,400.00	\$22,818.27	\$513,581.73	\$513,581.73
1912	475,500.00	45,640.00	-----	521,140.00	6,239.77	514,900.23	514,900.23
1913	583,100.00	47,850.00	-----	630,950.00	4,087.20	626,862.80	626,862.80
1914	664,000.00	57,307.79	-----	721,307.79	4,678.29	716,629.50	716,629.50
1915	730,500.00	55,424.60	-----	785,924.60	4,178.11	781,746.49	781,746.49
1916	757,300.00	48,710.87	-----	806,010.87	9,058.63	796,952.24	796,952.24
1917	981,060.00	52,400.00	-----	1,033,460.00	48,588.10	984,871.90	984,871.90
1918	1,467,070.00	51,901.98	\$3,062,000.00	4,580,971.98	395,745.10	4,185,226.88	1,172,939.64
1919	⁵ 3,245,285.00	49,542.86	⁶ 8,600,000.00	11,894,827.86	2,452,236.78	9,442,591.08	1,137,471.37
1920	1,216,897.00	52,800.00	-----	1,269,697.00	9,592.18	1,260,140.82	1,245,891.36
1921	1,362,642.00	62,618.72	666,720.00	2,091,980.72	13,985.89	2,077,994.83	1,412,923.15
1922	1,474,300.00	59,800.00	182,200.00	1,716,300.00	52,120.45	1,664,179.55	1,483,038.47
1923	1,580,900.00	70,814.30	97,100.00	1,748,814.30	10,959.08	1,737,855.22	1,640,840.57
1924	1,784,959.00	50,710.00	347,820.00	2,183,489.00	38,085.43	2,145,403.57	1,804,800.41
1925	2,028,268.00	57,500.00	236,465.86	2,322,233.86	107,743.20	2,214,490.66	1,998,669.20
1926	1,875,010.00	81,220.00	510,501.15	2,466,731.15	28,891.78	2,437,839.37	1,841,150.80
1927	1,914,400.00	94,443.39	325,000.00	2,333,843.39	44,871.29	2,288,972.10	1,926,910.12
1928	3,025,150.00	113,266.45	328,000.00	3,466,416.45	⁷ 736,235.62	2,730,180.83	1,997,270.66
1929	2,725,118.00	103,000.00	205,500.00	⁷ 3,753,094.67	⁸ 152,701.34	3,600,393.33	2,280,960.68
1930	2,274,670.00	123,300.00	166,200.00	⁸ 2,684,386.38	⁹ 135,714.93	2,548,671.45	2,216,995.72
1931	2,745,060.00	120,680.91	166,500.00	⁹ 3,134,595.10	¹⁰ 195,534.37	2,939,060.73	2,304,121.45
1932	2,278,765.00	137,866.48	194,500.00	¹⁰ 2,770,712.18	¹¹ 344,689.43	2,426,022.75	2,186,799.92
1933	1,860,325.00	75,100.00	184,000.00	¹¹ 2,361,138.96	¹² 475,895.41	1,885,243.55	1,710,949.42
1934	1,574,300.00	50,230.00	17,000.00	¹² 1,872,586.04	¹³ 397,131.28	1,475,454.76	1,254,846.72
1935	1,293,959.07	50,000.00	126,513.10	¹³ 1,520,472.17	¹⁴ 34,154.47	1,486,317.70	1,349,940.11
1936	1,970,311.00	69,500.00	47,570.00	¹⁴ 2,114,966.51	¹⁵ 14,074.34	2,100,892.17	2,052,751.87
1937	2,093,200.00	69,000.00	73,000.00	¹⁵ 2,237,812.45	¹⁶ 8,700.66	2,229,111.79	2,161,472.73
1938	2,272,720.24	83,000.00	62,300.00	¹⁶ 2,421,985.69	¹⁷ 59,920.71	2,362,064.98	2,286,858.08
1939	2,857,335.62	88,790.00	96,650.00	¹⁷ 3,086,719.30	¹⁸ 76,394.43	3,010,324.87	2,373,409.85
1940	2,849,676.33	93,290.00	96,125.00	¹⁸ 3,183,455.29	¹⁹ 134,645.00	3,048,810.29	2,945,361.06
1941	2,930,880.00	91,790.00	80,300.00	¹⁹ 3,102,970.00	-----	-----	²⁰ 2,816,180.00

¹ Includes printing and binding, stationery, and contingent funds.

² Includes proceeds from sales of residue gas.

³ Service items include Government fuel yards, helium, and other investigations and services for other departments.

⁴ Includes gas investigations for War Department.

⁵ Includes \$1,586,388 for Government fuel yards.

⁶ Includes War Minerals Relief Commission, \$8,500,000.

⁷ Includes \$719,476.67 unexpended balance reappropriated.

⁸ Includes \$120,216.38 unexpended balance reappropriated.

⁹ Includes \$102,354.19 unexpended balance reappropriated.

¹⁰ Includes \$159,580.70 unexpended balance reappropriated.

¹¹ Includes \$241,713.96 unexpended balance reappropriated.

¹² Includes \$231,056.04 unexpended balance reappropriated.

¹³ Includes \$50,000 unexpended balance reappropriated.

¹⁴ Includes \$27,585.51 unexpended balance reappropriated.

¹⁵ Includes \$2,612.45 unexpended balance reappropriated.

¹⁶ Includes \$3,965.45 unexpended balance reappropriated.

¹⁷ Includes \$8,399.29 unexpended balance reappropriated, and balance of \$35,544.39 receipts from sale of helium and other products.

¹⁸ Includes \$13,541.41 unexpended balance reappropriated, and balance of \$58,822.55 receipts from sale of helium and other products.

¹⁹ Includes \$31,309.25 unexpended balance reappropriated, and balance of \$85,452.95 receipts from sale of helium and other products.

²⁰ Estimated.

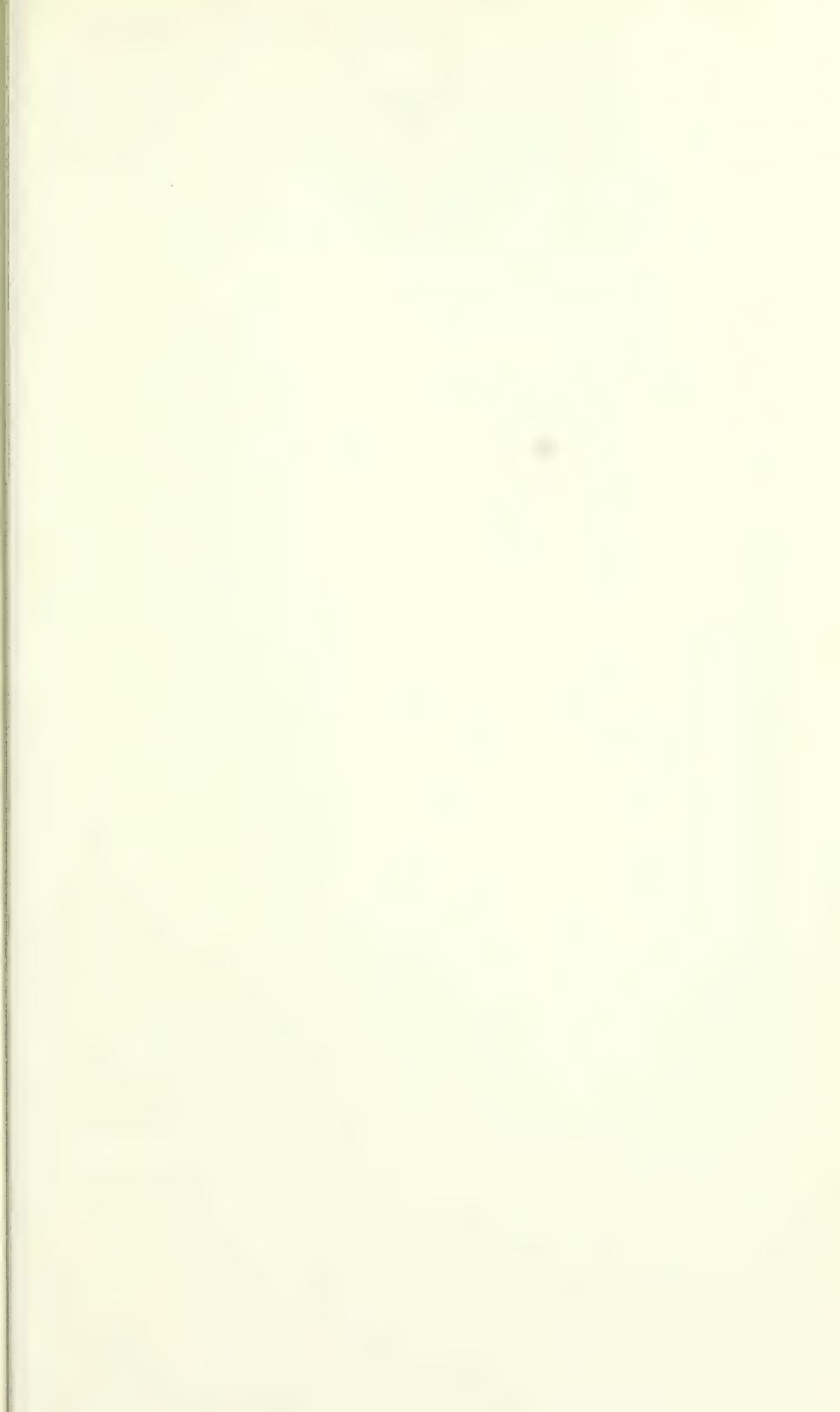
TABLE 2.—Bureau of Mines Expenditures, Fiscal Year 1940

Branch or division	General expenses	Operating rescue cars and stations and investigations of accidents	Testing fuel	Mineral mining investigations	Oil and gas investments	Expenses mining experiments stations	Economies of mineral industries	Care, etc., buildings and grounds, Pittsburgh, Pa.	Investigation of domestic sources of mineral supply	Purchase of land, etc., Bruceton, Pa.	Helium production	Development and operation helium properties S. F.	Engineering, Bureau of Engineering	Appreciation of foreign currency	Printing and binding	Contingent expenses, Department of Interior	Total
Office of the Director	\$9,745					\$372											\$10,117
Office of the Assistant to the Director	7,762					865											8,627
Total	17,507					1,237											18,744
Administrative Branch:																	
Office Administrative Division	46,735	\$26,068	\$275			2,110	\$7,241		\$5,616		\$3,537	\$420			\$2,772	\$7,892	102,666
Information Division	1,041	8,823	14,522	\$11,084	\$14,002	22,419	10,167	\$5,244			256	680			4,268		92,506
Total	47,776	34,891	14,797	11,084	14,002	24,529	17,408	5,244	5,616		3,793	1,100			7,040	7,892	195,172
Technologic Branch:																	
Coal Division		93,189	241,720														432,336
Explosives Division		94,803						89,612		\$29,825					7,815		125,549
Metallurgical Division						229,785			72,325						7,921		436,141
Mining Division				126,989		22,768			266,015			\$3,931			9,744		481,059
Nonmetals Division		51,393	127,208			263,275									1,390		264,665
Petroleum and Natural-Gas Division					245,630						68,439	26,186			4,241		344,496
Principal Mineral Technologist				8,894													8,894
Total		239,385	241,720	263,031	245,630	515,828		89,612	338,340	29,825	68,439	26,186	3,931		31,153		2,093,080
Economies Branch:																	
Coal Economies Division							28,466										28,899
Foreign Minerals Division							26,307								433		26,307
Metall Economies Division							48,844								362		49,206
Mineral Production and Economies Division							100,194								26,194		126,388
Nonmetal Economies Division							50,850								970		51,820

TABLE 2.—Bureau of Mines Expenditures, Fiscal Year 1940—Continued

Branch or division	General expenses	Operating rescue cars and stations and investigations of accidents	Testing fuel	Mineral mining investigations	Oil and gas investigations	Expenses mining experiments	Economics of mineral industries	Care, etc., buildings and grounds, Pittsburgh, Pa.	Investigation of domestic sources of mineral supply	Purchase of land, etc., Bruceton, Pa.	Helium production	Development and operation helium properties S. F.	Engineering, Bureau of Engineering	Appreciation of foreign currency	Printing and binding	Contingent expenses, Department of Interior	Total
Economics Branch—Continued: Petroleum Economics Division							58,490								2,123		60,953
Total							313,691								30,082		343,773
Health and Safety Branch: Safety Division		330,853													16,965		347,818
Health Division		30,174													50		50,224
Total		381,027													17,015		398,042
Total appropriation	66,000	656,000	257,400	274,860	260,000	542,000	331,500	95,000	350,000	35,000	103,541	112,739	4,000	\$2,125	85,290	8,000	3,183,455
Total expenditures	65,283	655,303	256,517	274,115	259,632	541,594	331,099	94,856	343,956	29,825	72,232	27,286	3,931		85,290	7,892	3,048,811
Balances	717	697	883	745	368	406	401	144	6,044	5,175	131,309	185,453	69	2,125		108	134,644

1 Available for expenditure in fiscal year 1941.





GEOLOGIC STUDIES PROMOTE EFFICIENT DEVELOPMENT.

Upper: The Geological Survey examines areas such as this in the front range of the Rockies, which forms the boundary between the crystalline rocks to the west, containing gold, silver, tungsten, and other metals, and the eastward-dipping sedimentary rocks with resources of clay, coal, and petroleum.

Lower: Dredging placer gold near Fairbanks, Alaska.

GEOLOGICAL SURVEY

W. C. Mendenhall, *Director*

WITH a full sense of its responsibilities in the present as in earlier national emergencies, the Geological Survey in 1940 emphasized those phases of its activities that bear upon the program of national defense. Although funds available for the prosecution of its work were more than a million dollars less than in 1939, owing principally to the cessation of Public Works allotments, nevertheless, the direct appropriations, which previously had been restored to their earlier level and were supplemented by transferred appropriations, cooperative funds, etc., enabled the Survey to close the fiscal year with a gratifying record of accomplishment.

As war disrupts the normal channels of commerce, nations suddenly become acutely conscious of their dependence upon international trade to supply many of those materials that have become a part of normal life. We can soon learn to do without nonessentials, but for successful defense under modern conditions some materials are indispensable. None are more important among these than certain of the minerals necessary to make the machinery of war. Richly endowed as it is with a great variety of mineral resources, the United States is nevertheless deficient in some of these. They must be acquired by importation while sea lanes are still open, by discovery of new supplies at home, or by learning to use lower grades than those to which we are accustomed.

This field of the strategic and critical minerals is one in which the Survey is necessarily active. Through its normal activities over a long period and its special studies during the first World War, it has acquired an intimate acquaintance with the mineral supplies of the United States. It is thus especially well equipped to advise those charged with the national defense about our known resources and what must be done to augment them; and to pursue further intensive studies that are revealing deposits, inadequately known, perhaps not normally usable, but quite capable of extraction and use under emergency conditions. Thus the field of dependence upon outside sources is being narrowed and self-sufficiency broadened.

Congress made a small special appropriation for studies of this character for the fiscal year 1940, funds becoming available on August 10, 1939. A number of geologic parties were promptly or-

ganized and sent to the field to search for and examine possible sources of manganese, antimony, chromite, quicksilver, tin, tungsten, and mica in many of the States. Condensed reports containing estimates of grades and quantities of the ores of these metals and minerals were submitted during the year on 18 of the projects, and 4 of these reports were in the hands of the printer by July 1.

Although there has been a concentration of energies on the strategic minerals studies, nevertheless the regular program of geologic and related investigations was carried forward. New Federal projects were begun and others completed in a number of important mining regions, involving studies of vanadium, coal, oil, potash, etc., and much other normal geologic work was done in cooperation with the States and with many national groups.

Stimulated by the devastating succession of droughts and floods in recent years and the consequent growing national water consciousness, the Survey's investigations of surface and underground waters have been growing markedly. Direct appropriations have increased steadily, contributions from States and municipalities have been larger, and funds transferred from other Federal agencies have been mounting. This last is particularly true of the Corps of Engineers of the Army, which has supervision of Federal investigations and improvements for flood control and which must have the basic information obtained by the Geological Survey as a proper approach to the problems of flood control. In 1940 the Survey's investigations for the Army Engineers were the most extensive in our history. Indications are that demands for such information will increase as population grows and the necessity for protective and conservational efforts are more fully realized.

One of the vital needs in the conduct of military operations is the availability of adequate topographic maps. Maps cannot be made after an emergency arises. They must be ready in advance.

The Survey has long advocated an acceleration in its mapping program, both as a base for normal peacetime development and as an essential to national defense. The War Department, directly responsible for land defense, is acutely conscious of map deficiencies. It has joined the Geological Survey in urging that a mapping program be made an essential part of the defense program. Congress indicated a partial recognition of this situation by providing \$1,210,350 before the close of the year for mapping strategic areas in accordance with priorities to be determined by the Secretary of War. This sum is far short of the sum needed and recommended for this work, but it is encouraging as a recognition of a principle.

Approximately 25,000 square miles in the United States and Puerto Rico were covered by topographic surveys during the fiscal year

1940. Fourteen States, Puerto Rico, and the Tennessee Valley Authority cooperated in much of this mapping. As in 1939, stereophotogrammetric equipment and the aerocartograph, instruments by which mapping is accomplished through the use of airplane photographs, were used in mapping a part of the total area, notably that in the Tennessee Valley.

A small but specially trained staff of scientists and engineers continued their investigations of Alaska's mineral resources. The results of their work in 1940, as in previous years, will doubtless contribute much to the development of the Territory and especially to the industry that to date has produced minerals valued at more than \$800,000,000 and is adding some \$25,000,000 each year. Particularly significant in the 1940 work were the examinations of strategic minerals and a detailed mapping project undertaken at the request of the War Department.

Continuing its activities in the administration of the land-classification and mineral-leasing laws, the Geological Survey made more than 7,500 reports upon the mineral resources, water power, or storage possibilities of public lands, at the same time safeguarding the Government's ownership of great reserves of coal, oil, gas, potash, phosphate, and other minerals. Technical supervision was given to more than 6,500 properties containing oil and gas, more than 600 containing coal, and 100 containing other minerals. On Indian land more than 4,500 oil and gas leases were supervised, in addition to more than 200 properties containing coal, asbestos, lead, and zinc. Minerals produced during the year from public and Indian lands and naval petroleum reserves under supervision of the Geological Survey had an estimated value of \$80,000,000, and revenue received by the Government as a result of this production amounted to about \$8,000,000.

GEOLOGIC BRANCH

GENERAL STUDIES

The projects in the various States, outlined on pages 44-50, illustrate the diversity and scope of the Geologic Branch's program. This program has been planned not only to aid in the solution of immediate economic problems but also to contribute to the more substantial foundation on which the future development of the country must be built. Although our Nation is richly endowed with natural resources, we have reached the stage at which sober thought must be given to their continued availability. During our unparalleled growth easily discovered resources were exploited and exhausted to such an extent that careful planning is becoming increasingly essential. Many of our leading producers are alive to the situation, but it is difficult

to appreciate the value of broad fundamental geologic work until the need for its practical application becomes urgent. Exploration for new, concealed deposits is becoming increasingly dependent upon a sound understanding of fundamental principles of geology. The same is true of broad plans for conservation and industrial development. For this reason the Geologic Branch has been pursuing regional investigations as well as detailed surveys and periodic resurveys of mineral districts. This program has been carried on by a closely coordinated group of specialists in each branch of geology, including mineralogy, petrography, and paleontology, and in related branches of chemistry, physics, and geophysics.

During 1940, as in previous years, these specialists not only carried out specific assignments but continued to develop and improve field and laboratory methods and new apparatus and, as time permitted, conducted research investigations of fundamental character. The laboratory work not only contributed to the solution of practical problems in geology but led to the discovery of another commercial deposit of bleaching clay, essential to the petroleum industry.

An outstanding feature of the 1940 program was a continuation of the intensive study of strategic mineral deposits begun in 1939 under the auspices of the Public Works Administration. This program, which is expected to continue for 4 years, was supported in 1940 by a special fund of \$150,000. During 1940 thirty-four projects were undertaken, some regional or reconnaissance in scope but most of them detailed studies leading to estimates of the quantities and grades of ore that could be mined under varying economic conditions. Two-thirds of these investigations were completed, and before the end of the fiscal year 4 reports on them were in press, and 14 more had been submitted for critical review and editing. Encouraging results of the work thus far justify the conclusion that the United States could supply its own needs for quicksilver and tungsten, if imports were suspended, and could greatly increase its contribution of manganese and antimony.

Other noteworthy accomplishments were the completion of a map showing the relations of mineral veins to regional geologic structure in the Ouray-Red Mountain-Telluride district, Colorado, which will serve as a basis for estimating future productivity in the region; completion of a detailed survey of the oil and gas resources of the Osage Indian Reservation, which points the way to future exploration and development; completion of a survey of the classic Henry Mountains and vicinity, which throws new light on the complex igneous geology and appraises the mineral resources of the region; completion of oil and gas maps of the United States and of Kansas, Louisiana, Oklahoma, and Texas; revision of a map showing coal fields of the United

States; completion of reports on the scenery of Florida as interpreted by a geologist and on the geology and geography of Zion National Park; contributions to a tectonic map of the United States sponsored by the National Research Council and to a volume on the structural control of ore deposits, also sponsored by the Council; completion of a survey of the geology, phosphate, and coal resources of the Afton quadrangle in Wyoming; studies of geologic factors affecting flood control in Massachusetts; completion of report on origin of coal, a critical review of the progress and conclusions given in literature on the subject, for publication by the National Research Council; and preparation and transmittal of two reports on the outstanding features of oil-field development and petroleum geology in this country—one for the period 1934–38 and the other for the year 1939—for use of the Petroleum Investigation Subcommittee of the Committee on Interstate and Foreign Commerce, House of Representatives, which supplement a report on the geology and occurrence of petroleum in the United States prepared for hearings of a similar committee of the House of Representatives, Seventy-third Congress, on House Resolution 441.

Work was continued in the classic areas of the Big Horn Basin, Wyo., the Permian basin of West Texas, the Death Valley region and the Sierra Nevada, where additional evidence was obtained on recent (post-Pleistocene) glaciation and the age of Owens Lake.

The Section of Chemistry and Physics, besides its regular analytical and advisory work for the geologic staff, continued research work on analytical methods, on the origin of quicksilver minerals, the thermal dehydration of clay and other minerals, the composition and physical properties of certain rare minerals, the mineral composition of saline deposits, the gases in hot springs, the physical constants of rocks and minerals, and the correlation of thermal gradients in the earth with heat effects caused by the radioactive disintegration of various elements.

The Section of Geophysics continued work on the design and construction of geophysical instruments, computation of magnetic scales, tables, and charts, preparation of geophysical abstracts, and cooperation with the Bureau of Mines in the study of seismic vibrations caused by quarry blasts. Several bulletins on geophysical abstracts and a paper on the use of scales in evaluating magnetic anomalies were submitted for Survey publication.

General paleontologic and stratigraphic investigations were in progress on Cenozoic echinoids of the eastern United States, the Foraminifera of the Gulf coastal region, the foraminiferal family Buliminidae and the family Globigerinidae, Eocene Foraminifera from submarine cores off the eastern coast of North America, Carboniferous crinoids, diatoms, and Fusulinidae.

Services rendered by the Survey to other Federal agencies included expert advice to the Army and Navy Munitions Board, the Advisory Commission to the Council of National Defense, and the Joint Committee to Investigate the Adequacy and Use of Phosphate Resources of the United States; examinations of tunnel and dam sites and foundations for the Bureau of Reclamation; investigations of mining claims and mineral deposits and geology for the National Park Service; studies of erosion and deposition along ocean shore lines for the Army engineers and the Department of Justice; studies of geologic factors that may affect the death rate from tuberculosis for the Public Health Service; and preparation and microscopic examination of thin sections of rocks and construction of apparatus in the geophysical shop for the Bureau of Mines.

The Survey also took a very active part in the International Geophysical Congress held in September 1939 and in the activities of the International Glacier Commission, and its members, as usual, were active in the affairs of scientific societies in the United States.

WORK OF THE YEAR, BY STATES

Alabama.—Geologic mapping was carried on in the Epes quadrangle, Sumter County, and work was done on the upper Eocene, the Vicksburg, the lower Claiborne, the Tallahatta, the Upper Cretaceous, and the Carboniferous formations and on Midway and lower Oligocene Foraminifera of the State. A paper on problems in the geology of the Coastal Plain of Alabama, for publication by the State of Alabama, and a review of the Upper Cretaceous of Alabama, for incorporation by the State in a report on the subject by the Alabama Geological Survey, were submitted. A paper on the molluscan fauna of the Chickasawhay formation, Alabama and Mississippi, was published in the *Journal of Paleontology*. Work on comprehensive reports on the iron ore in the Red Mountain formation of northeastern Alabama, where field work was continued in the Greasy Cove area, and on the brown iron ore of the Russellville district was continued. A paper was submitted to the State on the cement industry in Alabama.

Arizona.—Projects on the geology and mineral resources of the Benson, Pearce, and Tucson quadrangles and on manganese deposits in the Artillery Peak Mountains were continued. Quicksilver districts in Arizona were examined in connection with the strategic minerals program. Work in the St. George region and on the Hurricane fault is mentioned under Utah. A report on the mining claims of the Hearst Estate, Inc., in Grand Canyon National Park, was made for National Park Service.

Arkansas.—Reports on manganese carbonate in the Batesville district and on the geology of the Fort Smith district have been transmitted for official publication.

California.—Field study was continued of the Santa Maria oil district, Santa Barbara County, and geophysical studies by resistivity magnetometer methods were made in the Newton placer-mining district, near Quincy. The following projects were continued: Monterey formation and the origin of its siliceous rocks; Foraminifera of Kreyenhagen shale of Garza Creek; areal and structural studies

in Death Valley region and San Andreas rift area; geomorphology of San Joaquin Basin; subsurface and economic phases of the Kettleman Hills oil field; the Mother Lode; and glacial deposits in relation to fault scarps at the east front of the Sierra Nevada. A report on the geology and paleontology of the Palos Verdes Hills was transmitted for Survey publication, and one on the geology and paleontology of Reef Ridge is practically completed. Collection of well-record data and correlation of samples from oil wells, particularly from the Los Angeles Basin, were continued, in cooperation with the American Institute of Petroleum Engineers, in connection with a general study of source beds of petroleum. Strategic-minerals investigations consisted of studies of quicksilver in San Simeon and Adelaide quadrangles, San Luis Obispo County, in Mount Diablo district, Contra Costa County, in Mayacmas and Sulphur Bank districts, Lake County, and in the Santa Inez and Los Prietos mines, Santa Barbara County; of tungsten in the Atolia district, San Bernardino and Kern Counties, and in the Bishop and other areas, Inyo and Mono Counties; of antimony in Wildrose Canyon, Inyo County, and reconnaissance of deposits in San Bernardino and Kern Counties; and of chromite in the vicinity of San Luis Obispo and the Pilliken chromite deposits in western Eldorado County. A preliminary report on quicksilver in Lake County was transmitted for Survey publication. Preliminary reports on the Mount Diablo quicksilver deposit and on the tungsten deposits in the Tungsten Hills, Inyo County, have been completed, and one on quicksilver deposits of San Luis Obispo and southwestern Monterey Counties is in preparation. A preliminary report on the Pilliken chromite deposits was transmitted, and one on chromite in Seiad quadrangle, Siskiyou County, is in press.

Colorado.—Continued cooperation with the Colorado State Board and the Colorado Metal Mining Fund included investigations in metal-mining districts of Ouray, Red Mountain, Sneffels, Telluride, and La Plata in the San Juan region, and Cripple Creek, Gold Hill, and St. Kevin; in placer districts on Tarryall and Beaver Creeks and South Platte River in Park County; and investigations of vanadium and uranium in Paradox Valley. Work was begun in the upper Arkansas Valley in the vicinity of Leadville, in the tungsten belt of Boulder County, and in the northern part of the Mosquito Range in the vicinity of Fairplay. Progress was made on reports on the geology and ore deposits of Front Range, and the Nederland tungsten, Jamestown, and Leadville districts. A preliminary geologic map of Telluride-Red Mountain-Sneffels area and a report on tungsten deposits of Boulder County were completed for Survey publication, and preliminary reports on the Gold Hill mining district, Boulder County, and on placer and lode deposits in the area drained by Beaver and Tarryall Creeks were prepared for the Colorado Scientific Society. Reports on structural control of ore deposits in the Front Range, on structural control of ore deposits in the Aiba and other districts, and on physical factors in localization of ore deposits were prepared for publication in a volume sponsored by the National Research Council. Papers on the genesis of the tungsten ores, on zonal mineralization and silicification in the Horseshoe and Sacramento districts, and on radioactive cerite near Jamestown were submitted for outside publication. Paleontologic and stratigraphic studies were made of the Cretaceous and Tertiary boundary in the Rocky Mountain region, field mapping of the Cretaceous and "Paleocene" was begun in southwestern Colorado, and a magnetometer survey was made of the Cripple Creek district. Reports on the Permian in parts of the Rocky Mountain and Colorado Plateaus, on the petrology and stratigraphy of the La Plata formation, and on the Jurassic stratigraphy of Colorado, Utah, and New Mexico are in preparation. A report on geology of

dam sites on the Green and Yampa Rivers, Utah and Colorado, was made for the Bureau of Reclamation.

Florida.—Further field work in cooperation with the Florida Geological Survey was done in the eastern part of the peninsula in connection with the revision of the geologic map of Florida and a report on the geology of the State. A paper entitled "The scenery of Florida as interpreted by a geologist" was submitted to the State for publication. Further studies were made of the Alum Bluff group, of the Tertiary stratigraphy, and on a magnetic survey of the peninsula. A report on phosphate reserves of Florida was completed for Survey publication.

Georgia.—Study of Cartersville region was continued and brief examination made of bauxite deposits in Stewart County. Papers were prepared on structure and ore deposits at Cartersville, for the American Institute of Mining and Metallurgical Engineers, and on localization of Georgia gold, for inclusion in a book on ore localization.

Idaho.—In continued cooperation with the Idaho Bureau of Mines and Geology, geologic field studies, for which reports are under way, were conducted in the Seven Devils area; in the Riggins and Meadows quadrangles, with special reference to placers; and in the Ione and Blue Wing tungsten districts, Lemhi County. Work was done on reports on the Rocky Bar district, the Boise Basin, and the geology of quicksilver deposits near Weiser. A report on faulting in western Idaho and its relation to high placer deposits was completed for Survey publication. Papers on geology and metalliferous deposits of Kootenai County and on gold placers of Secesh Basin, Idaho County, were submitted to the State; on observations of the rate of creep in Idaho, to the American Journal of Science; and on bedding vein deposits near Murray and structural control of ore deposits at Boise Basin, to the American Institute of Mining Engineers. In the search for strategic and critical minerals a detailed study was made of the antimony deposits in the Yellow Pine district, a preliminary report on which is practically completed. Noncooperative projects consisted of detailed examinations of the Irwin and Afton quadrangles. Work was resumed on general reports on the geology of the Paradise Valley and Ammon quadrangles. Work in the Teton Basin and in the Afton quadrangle is mentioned under Wyoming, and on glacial geology and physiography under Montana.

Illinois.—The report on lower Pennsylvanian floras of Illinois and adjacent States, begun by the late David White, was revised and transmitted to the State Geological Survey Division for publication.

Kansas.—Cooperation with the State during the year consisted of a study of subsurface features of the Forest City Basin. The report on the subsurface Mississippian rocks of Kansas, giving the results of former cooperative studies, was transmitted to the State. Brief descriptive texts on Mississippian rocks in Linn and Montgomery Counties were submitted to the State for printing on the backs of maps of these counties. A paper on Mississippian limestone of central and eastern Kansas has been prepared for inclusion in an article on the stratigraphy of Kansas for a special Kansas issue of the Oil and Gas Journal. The oil and gas map of Kansas was completed. Lead and zinc in the tri-State area is mentioned under Missouri.

Maryland.—Floras of the Pocono and Price formations are mentioned under Pennsylvania.

Massachusetts.—Geologic work in cooperation with the Commonwealth of Massachusetts, Department of Public Works, comprised continuation of de-

tailed mapping in the Lowell and Blue Hills quadrangles and in parts of the Norwood, Belchertown, and Milford quadrangles, a study of the glacial deposits and general geologic features of Cape Cod, and geologic work in various sections of the State in relation to highway construction and flood control. The following reports were transmitted to the Massachusetts Department of Public Works: Geology of the coast line between Point Gammon and Monomoy Point on Cape Cod; Occurrence of diabase in Dunstable and Tyngsboro at Lowell; and the occurrence of gravel in the Granville quadrangle. Reports on geology of flood areas in parts of Massachusetts and Vermont, on geologic features of the Connecticut Valley as related to recent floods, and on seismic surveys on bed-rock near Lowell are nearing completion, and one on the origin of the Chelmsford granite is in preparation.

Mississippi.—Studies of the stratigraphy and structure of the Jackson area in the Raymond, Jackson, Florence, and Pellahatchie quadrangles and of the gastropods of the Vicksburg group and of the molluscan fauna of the Chickasawhay formation of Mississippi and Alabama were in progress, and one on the stratigraphy of Upper Cretaceous deposits of Mississippi was completed and a report thereon transmitted to the Mississippi Geological Survey.

Montana.—The following studies were continued: Coal resources of Otter Creek area in Rosebud and Powder River Counties; general geology and physiography of the Little Rocky Mountains, of the plains south of Bearpaw Mountains, and of the Fort Belknap Indian Reservation, including mines and mining prospects; Pliocene and Recent fault scarps in western Montana; glacial geology and physiography of western Montana; the Lance-Fort Union correlation of southeastern Montana; and fossil plants of the Fort Union and associated formations of Montana, Wyoming, and North Dakota. Magnetometer surveys were continued in the Highwood Mountain area, with special reference to the problem of locating feeders of laccoliths. Geologic mapping of the northern part of the Nye No. 2 quadrangle and studies of the geology and coal resources of an area in southern Powder River County were begun. A paper on stratigraphy of the Belt series in Libby and Trout Creek quadrangles in northwestern Montana and northern Idaho will be published by the Geological Society of America. In investigations of strategic minerals studies were made of manganese in the Philipsburg special quadrangle and the Butte district and of chromite deposits in the Stillwater area. A preliminary paper on manganese deposits at Philipsburg has been completed.

Nevada.—Projects for the study of strategic and critical minerals included tungsten deposits near Cosgrave (Mill City), Pershing County, in the Nightingale, St. Anthony, and Ragged Top districts, and in East Range, Sonoma quadrangle; quicksilver in the Bottle Creek-McDermitt areas and Buckskin Peak, Humboldt County, in the Ivanhoe district, Tobin Range, and near Vya; a reconnaissance of antimony deposits in the State; and studies of manganese deposits in the Sonoma quadrangle and near Ely. Reports are in preparation on manganese-tungsten deposits in Nevada; tungsten at Rose Creek; tungsten in the Nightingale, St. Anthony, and Ragged Top districts; tungsten deposits of northwestern Nevada; and the Majuba Hill tin mine. Preliminary reports on quicksilver of Buckskin Peak, National district, and on the quicksilver deposits of the Bottle Creek district will soon be issued by the Survey. An investigation was made of the Great Eastern nickel mine in Clark County. Projects continued were studies of general geology and ore deposits of the Eureka district and of the Hawthorne, Tonopah, Ivanpah, and Sonoma Range quadrangles; a resurvey of the Comstock lode, and resistivity and magnetic

surveys in the Austin district and in the Comstock lode. A paper on the Basin and Range province in Utah, Nevada, and California was completed.

New Mexico.—Work was continued on the reports on the geology, coal, gas, and oil resources of the eastern San Juan Basin and the Potash Mines quadrangle. A report on geology and ore deposits of the Magdalena district and a paper on transgressive and regressive Cretaceous deposits in southern San Juan Basin were submitted for Survey publication. A paper on manganese in the Little Florida Mountains and a preliminary report on tin deposits of the Black Range will be published in the bulletin *Strategic Minerals Investigations, 1940*.

New York.—Study of general geology of the Millbrook quadrangle, New York and Connecticut, was continued.

North Carolina.—In cooperation with the National Park Service a geologic map of the Blue Ridge from Adney Gap south of Roanoke, Va., to Asheville, N. C., was prepared and submitted to the Park Service. A study of the tin belt of North Carolina was continued under the strategic minerals appropriation, field work being done in the vicinity of Lincolnton and Kings Mountain. Examinations of mica and mica-feldspar mines and prospects in the Spruce Pine and Franklin districts were begun. Gossan lead is mentioned under Virginia.

Ohio.—Pennsylvanian stratigraphy is mentioned under Pennsylvania.

Oklahoma.—Areal mapping and underground studies of lead and zinc mines in the tri-State area (Oklahoma-Missouri-Kansas) were carried on, and studies were made of Mississippian faunas from the Wyandotte quadrangle (Oklahoma-Missouri) and of the stratigraphy and paleontology of the Paleozoic section at Ardmore and Sulphur. A study of subsurface geology and oil and gas resources of Osage County was continued. Progress was made on a general work on the subsurface stratigraphy and structure of Osage County and their relationships to oil and gas. Projects in the Omachita Mountains were continued in the Black Knob area and in the area west of Potato Hills.

Oregon.—In cooperation with the Oregon Department of Geology and Mineral Industries mapping was done in the southern part of the Grants Pass quadrangle, magnetometer surveys in the Willamette Valley in the Coos Bay region were begun in connection with the location of chromite-bearing beach deposits of black sand, and a preliminary geologic map of the Medford quadrangle was issued by the State. Other projects and reports under way included the Pennsylvanian flora from central Oregon, Permian Fusulinidae from eastern Oregon, and geology and ore deposits of the Sumpter quadrangle. Work on strategic minerals included a study of chromite in the John Day and other areas in Grant County, in the Grants Pass and Kerby quadrangles, and in the vicinity of Sumpter, Granite, and Olive Lake and visits to a number of mercury districts. Reports were prepared on the eastern half of the Canyon City chromite belt of Grant County: the chromite deposits of the Briggs Creek area, Josephine County, and the Sourdough area, Curry County; and on manganese deposits in the Lake Creek district.

Pennsylvania.—Studies were in progress on regional metamorphism in lower Kittanning coal beds; on a detailed section of coal-bearing rocks across the bituminous coal basin of Pennsylvania (Appalachian coal basin); on the general geology and mineral resources of the Hanover and York quadrangles; on the floras of the Pocono and Price formations in parts of Virginia, West Virginia, Pennsylvania, and Maryland; and on stratigraphic relationships of some lower Pennsylvanian formations in Pennsylvania. Field work was continued in the Reading-Boyertown area, in cooperation with the Pennsylvania Geological Survey, and papers were prepared on physiography of the Appalachians and age and struc-

ture of the rocks of the Glenarm series for the twentieth anniversary of the Pennsylvania Survey held at Harrisburg.

South Carolina.—Investigation on tin in the vicinity of Gaffney was continued as a strategic minerals project. A paper on elliptical bays in South Carolina has been submitted to the *Journal of Geology* for publication.

South Dakota.—Examination of the cassiterite-bearing pegmatites in the vicinity of Tinton was continued, and cooperative work was done with the Bureau of Mines. A preliminary report on tin in the Tinton district is nearly completed. A geologic map of South Dakota was submitted for Survey publication.

Tennessee.—A cooperative paper on manganiferous iron ore in Perry and Lewis Counties was transmitted to the State of Tennessee for publication, and work was continued on a cooperative report on the stratigraphy and structure of the east Tennessee zinc district.

Texas.—A report on the Shafter silver district was completed for publication by the Survey. A monograph on larger invertebrate fossils of the Navarro group of Texas was submitted to the Texas Bureau of Economic Geology for publication. Investigations of the West Texas Permian, the Sierra Diablo area, and new Fusulinidae from the Cisco group in the Brazos River region were continued, and stratigraphic and faunal studies of formations in eastern Texas and the Gulf region were begun. A paper on the subsurface geology and structure of the crosscut in the Blake oil district, Brown County, was approved for publication by the American Association of Petroleum Geologists.

Utah.—The field work in the Henry Mountains was completed, the work during the year consisting of the gathering of data on petrography and structure of the intrusions, in which the party was associated with members of the Geophysical Laboratory of the Carnegie Institution. Progress was made on a report on the geology and geography of the Henry Mountains and surrounding structural basin. Field studies were continued on the Strawberry Valley-Wasatch Mountains project; studies were begun in the American Fork region of the Wasatch Mountains, and in the St. George region; and were continued on the Hurricane fault. A report on late Mesozoic and early Cenozoic history of central Utah was transmitted for publication by the Survey; reports on the geology of Zion Canyon and Bryce Canyon National Parks and on Pennsylvanian and Permian Fusulinidae from the Strawberry Valley are in progress; and work on the final detailed report on alunite deposits of the Marysvale district was continued. An examination was made of tunnel sites along the Strawberry-Green River-Great Basin divide and report thereon submitted to the Bureau of Reclamation. Three manganese districts near Castle Dale were examined under the strategic minerals program. Papers were submitted for outside publication on a new interpretation of some laccolithic mountains and its possible bearing on structural traps for oil and gas, on manganese in a thermal spring in north-central Utah, on the Hurricane fault, and on volcanic sequence in the Marysvale region, south-central Utah.

Vermont.—Detailed areal mapping of the Barre quadrangle and small parts of adjacent quadrangles was continued.

Virginia.—Work on Gossan lead was conducted in cooperation with the Virginia and North Carolina Geological Surveys, and a report on the subject is in preparation for publication by the State of Virginia. Studies were made of the stratigraphy and faunas of the Pennsylvanian strata, chiefly the Pottsville in the Flattop coal field of Virginia and West Virginia. As a part of the strategic minerals program, work was done on the manganese of Alta Vista, on the tin deposits of Irish Creek, and on a mica prospect in the vicinity of

Lynchburg. Blue Ridge Parkway studies are mentioned under North Carolina.

Washington.—Studies were continued of the manganese deposits of the Olympic area as a strategic minerals project, and a preliminary report on these investigations was prepared for outside publication. A field investigation on the oil and gas possibilities of the Forks area on the west slope of the Olympic Mountains was begun.

West Virginia.—A study of wells recently drilled in West Virginia was made in connection with the problem of deep drilling in the Appalachian Plateau. An examination of the quality and quantity of coal deposits available from the Maxwell-Tidd mine near Valley Bend was made at the request of Farm Security Administration. Studies of the Pottsville are mentioned under Virginia, and floras of Pocono and Price formations under Pennsylvania.

Wyoming.—Projects connected with geologic studies of the west side and the northeast flank of the Big Horn Basin were continued, and a magnetometer survey was made of the chromite ore bodies of Casper Mountain. Compilation of geologic map and preparation of text for report on detailed geology of Afton quadrangle and a report on geology and limnology of the Green River formation of Wyoming were continued. A report on the Teton Basin phosphate deposits was begun. Fossil plants of the Fort Union are mentioned under Montana.

ALASKAN BRANCH

Because of the special conditions prevailing in Alaska, the Alaskan Branch is organized as a distinct unit to handle all of the Geological Survey's various activities in the Territory. This arrangement has made it possible to adapt operations to the climatic, transportation, and general physical conditions and has also led to the development of special methods and techniques for the scientific and professional phases of the work. There is special need in Alaska for rapid and inexpensive exploratory surveys of large tracts of virgin country in order to block out the broader features and to differentiate the areas that appear most susceptible of development from those that do not seem to have valuable potentialities. The more promising tracts are then mapped on reconnaissance standards, which again effects selective discrimination and focuses attention on the still smaller but more important areas for which detailed surveys are needed.

The following table shows the total area surveyed topographically and geologically to December 31, 1939:

	Exploratory surveys	Reconnaissance surveys	Detailed surveys	Total
Topographic surveys.....	84,962	185,586	4,542	275,090
Geologic surveys.....	107,152	148,597	4,071	259,820

For the areas as yet unsurveyed, approximately 300,000 square miles, it is expected that about the same percentages will hold for the near future—35 percent exploratory, 60 percent reconnaissance, and 5 percent detailed.

As the country develops, the relative proportion will change materially—detailed surveys will increase, reconnaissance surveys will decrease, and exploratory surveys will not be needed.

Although the maps and reports of the Geological Survey contain information that is practically indispensable in all enterprises concerned with the development of Alaska that call for consideration of routes of travel and transportation, sources of power and their utilization, settlements and land problems, the immediate purpose of the Survey's investigations is to determine the occurrence of valuable mineral deposits, their location, extent, volume, and characteristics. This necessitates studies of the conditions under which the mineralization took place, the factors favorable for the formation of workable deposits, the structural and other dynamic changes that may have affected the deposits after their formation, and the subsequent alterations that may have increased or lessened their value.

Already Alaska has contributed to the national wealth minerals to the value of over \$803,000,000 and each year is adding some \$25,000,000 more. Nearly a score of different mineral commodities enter into this production. In recent years the most important of these have been gold, copper, platinum metals, silver, coal, lead, tin, limestone, and antimony; in the past, marble, gypsum, barite, tungsten, chromium, and quicksilver have also been produced in significant amounts.

The field season begins in the Spring, and the money for the Survey's regular Alaskan investigations is made available immediately upon the passage of the annual appropriation act. The report for the fiscal year 1940, therefore, covers parts of two field seasons.

In both the seasons of 1939 and 1940 examinations were made, under special appropriation items, of deposits of certain so-called "strategic" minerals. In 1940 a detailed mapping project was carried on at the request of the War Department and with funds provided by that Department.

Field work.—During the field season of 1939 new geologic work was undertaken by the Alaskan Branch on Chichagof Island in southeastern Alaska; in the Gerstle and Robertson Rivers area on the northern flanks of the Alaska Range in Central Alaska; and in extreme western Seward Peninsula, near Tin City. In the Chichagof area part of the work was designed to afford detailed information as to geologic conditions in the gold-lode mines that have long been productive there, and part was aimed at tracing the geologic structures and formations northward to Yakobi Island, near the extreme northwestern tip of Chichagof Island, where deposits of nickel-bearing ores have been reported, in order to determine the probable extent and character of these potential nickel ores. The work in the Alaska Range region was a continuation of the endeavor to obtain all pertinent information regarding the prospective value of the mineral resources in this extensive tract of country. The work in Seward Peninsula was part of the regular Alaskan Branch investigations, but as it involved the

strategic mineral tin, special stress was put on obtaining quantitative data that would be useful in determining to what extent domestic supplies of tin might be available to the United States from this source.

The two topographic field projects included a survey of parts of the Alaska Range between the Chisana and Nabesna Rivers and the mapping of the Porcupine River and some of its tributaries from the Canada-Alaska boundary westward to the Yukon River.

A general purpose project was undertaken in 1939 to collect data regarding recent mining trends and developments and to obtain first-hand information that would aid in formulating plans for the future conduct of the work.

During the first part of the season of 1940 eleven principal field projects were carried on. Five of them involved geologic investigations of mineral resources, four were topographic investigations, and two were for general purposes. The new geologic projects include parts of Yakobi and Chichagof Islands in southeastern Alaska; part of the Alaska Range, including especially the section between Nabesna and Chisana Rivers; areas in western Seward Peninsula that have especial importance as possible sources for domestic supplies of tin; the southern part of Kenai Peninsula, where domestic sources of chrome ore are known to occur; and areas in the Copper River region, in the Yukon Valley near the international boundary, and places in southeastern Alaska where intensive paleontologic studies are required to aid in identifying correctly certain members of the geologic sequence and thus provide means for accurate correlations with other groups of rocks in Alaska, in the States proper, and perhaps throughout the world. The studies of the deposits of tin, nickel, and chrome are of particular importance and timeliness as these minerals are of vital importance in the nation's defense program. The four topographic projects include reconnaissance surveys of part of the valley of Holitna River, one of the large tributaries to the Kuskokwim that joins that river in about the central part of its course; the aerial photographing of an extensive tract of country, extending on the east from Nenana on the Tanana River to McGrath on the Kuskokwim River on the west, and including about midway between these points Lake Minchumina; a detailed survey of part of Annette Island in southeastern Alaska for an airplane landing field; and the filling in of gaps and the extension of former mapping in parts of the Copper River Valley and in the vicinity of Juneau. One of the two general-purpose projects of 1940 is comparable in its scope with the similar project undertaken in 1939 and described in the preceding paragraph. The other project was undertaken for the purpose of securing information required in certain phases of the current work of the branch and to make Survey reports, maps, and information more readily accessible and useful to the public.

Office work.—Much office and laboratory work was done to make the results of the field work available. This included identifying the specimens collected, completing the field sketches and drawings, and interpreting the various geologic observations. A major mapping project that did not involve field work during the season of 1939 but was carried on in the laboratories of the Geological Survey throughout the winter was the compilation of cartographic data from aerial photographs covering most of the lowland of the Tanana River from the Canada-Alaska boundary westward to about the longitude of Fairbanks, exclusive of a tract from Tanana Crossing to Delta River.

The usual annual canvass of the production of minerals from the Territory was made, including the analysis and tabulation of returns from mine operators throughout the Territory and the checking of these results with information

from other sources in order to show the amount of each kind of mineral produced, the districts from which it came, and the new developments that have taken place or are in prospect. This work has been completed for the year 1939 and the results prepared for publication; the canvass for 1940 is under way.

Reports and maps.—During the year four reports containing maps, seven maps (six new editions and one reprint), and two press statements have been published. Eight reports containing maps, two new maps, and a reprint of one map are in course of publication. In addition two reports, three maps, and a reprint of one map are partly prepared. Eight papers prepared by personnel of the Alaskan Branch were approved for outside publication.

TOPOGRAPHIC BRANCH

The headquarters office of the Topographic Branch and of its Atlantic and Central divisions is located at Washington; the headquarters office of the Pacific division is at Sacramento, Calif. Section offices were maintained at Denver, Colo., Rolla, Mo., Chattanooga, Tenn., and Detroit, Mich.

GENERAL OFFICE WORK

Necessary office work incidental to the field work of the Topographic Branch consisted of the computation and adjustment of the results of control surveys, photoplanimetric compilation, and the inking, inspection, and editing of the completed topographic field sheets prior to their submission for reproduction.

Section of Computing.—Computation and adjustment of the spirit leveling, transit traverse, and geodetic triangulation done for the control of current topographic mapping were continued as the routine function of the section. Readjustments of older control surveys in extended areas were completed to refer them to the standard datums of the United States.

Manuscripts containing the results of spirit leveling in Michigan and in parts of Texas, also the results of all transit traverse in Missouri, were prepared and transmitted for publication. The following bulletins were published during the year: 890-A, 890-B, Spirit leveling in South Carolina, in two parts; 898-G, 898-H, Spirit leveling in Missouri, the last of eight parts; 912, Spirit leveling in Utah; and 916-A, 916-B, 916-C, Transit traverse in Missouri, three of the eight parts.

Improved methods for computing and adjusting transit traverse were devised and put into practice.

Section of Photomapping.—Aerial photographs of which field interpretation had been made were used for the compilation, by the radial-line method, of planimetric bases of twenty-four $7\frac{1}{2}'$ quadrangles or parts of quadrangles in Louisiana, ten $7\frac{1}{2}'$ quadrangles or

parts of quadrangles in Michigan, and fifteen 15' quadrangles or parts of quadrangles in Wisconsin, covering a total of 3,595 square miles.

Line bases to assist in topographic mapping were compiled from aerial photographs by the radial-line method of part of a 15' quadrangle in Virginia-North Carolina, covering an area of 85 square miles, and of parts of three 7½' quadrangles in Michigan, covering an area of 122 square miles. Similar bases compiled from aerial photographs by use of the aerocartograph were made of part of a quadrangle in Virginia-West Virginia, covering 176 square miles, and of fifteen 7½' quadrangles or parts of quadrangles in Massachusetts and one in Rhode Island, covering an area of 680 square miles. Of the photographs used in photomapping, which covered areas totaling 22,021 square miles, those covering 7,199 square miles were purchased from commercial firms, those covering 70 square miles were hired from commercial firms, and those covering 14,752 square miles were purchased or borrowed from other Government agencies.

Section of Cartography.—Work on the United States part of the map of the world on the scale of 1:1,000,000 was continued. The compilation and inking of Sheet N J-18, Chesapeake Bay, was completed, and that of Sheet N K-16, Chicago, was in progress.

For the Public Roads Administration the preparation of the Transportation Map of the United States was continued. Compilation and inking were in progress on 78 sheets. Proofreading and checking were done on 37 sheets. Maps of 3 States, comprising 23 sheets, were published, and maps for 2 States, comprising 21 sheets, were in course of publication.

Section of Inspection and Editing.—During the year 22 new topographic maps were prepared for photolithographs as two-color advance sheets and 22 as planimetric maps; 129 new topographic maps were edited for publication, of which 102 were for multicolor lithographs and 27 for engraving; and 205 quadrangle maps, 34 State maps, and 12 State index maps were prepared and edited for reprint editions. Editing was also completed on 97 maps published as illustrations, making a total of 477 maps edited.

On June 30, maps in the process of reproduction included 181 topographic maps to be engraved, 1 two-color photolithograph, 65 multicolor photolithographs, and 20 planimetric maps. Of topographic maps to be engraved, 16 were in the process of editing, and 77 were awaiting editing. Of maps to be reproduced by multicolor lithography, 17 were in the process of editing, and 57 were awaiting editing.

For the Conservation Branch the work of preparing river surveys for publication was continued. Work was done on 23 different projects. The maps of 10 projects, comprising 48 separate sheets,

were transmitted during the year for reproduction by photolithography.

For the Tennessee Valley Authority 5 maps were prepared and transmitted for reproduction, and proofs of 10 maps were read.

MAP INFORMATION OFFICE

This office serves as a clearing house for geographic, topographic, and aerial photographic data pertaining to Federal as well as commercial mapping agencies. It maintains extensive card index files and houses a collection of sample maps of practically every type published by Government bureaus, foreign countries, and commercial mapping organizations. It is staffed and equipped to furnish expeditiously survey, map, and geographic information to Federal offices, State institutions, and to an interested public. The custodian of the Map Information Office acts also as secretary to the Federal Board of Surveys and Maps. The work of the Map Information Office, as well as that of the Board, is done entirely by Geological Survey personnel.

FIELD SURVEYS

Work was done in 46 States, in the District of Columbia, and in Puerto Rico. Cooperative projects were conducted in 14 of these States, in Puerto Rico, and with the Tennessee Valley Authority.

For the Tennessee Valley Authority, mapping within the Tennessee River Basin was continued by the use of aerial photographs and the stereophotogrammetric method. On June 30, 32 Geological Survey employees were engaged on this project.

Of the total area of the United States, 45.8 percent has been covered by topographic maps prepared by the Geological Survey.

WORK OF THE YEAR, BY STATES

Alabama.—The 7½' quadrangles Chuckbey Bay, Kushla, Silver Hill, Theodore, and Wheelerville completed and Stapleton and Rock Run and vicinity (Ala.-Ga.) begun.

Arizona.—The 15' quadrangles Chloride, Silver Reed Mountains, and Tubac completed and Palo Alto and Sunset begun.

Arkansas.—The 15' quadrangle Antoine completed. In cooperation with the Arkansas Geological Survey, the 15' quadrangle Smyrna and the 7½' quadrangles Scott Northeast, Scott Southwest, and Scott Southeast completed and Cabot Southeast begun.

California.—The 15' quadrangles Cayucos, El Cajon, Idria, Jamul, and Port San Luis and the 7½' quadrangles La Jolla Southeast and San Diego Northeast completed and the 15' quadrangle Cuyamaca begun. In cooperation with the State engineer of California, the 15' quadrangles Cape Fortunas and Rohnerville begun.

Colorado.—The 15' quadrangles Elizabeth completed and Castle Rock, Elbert, Garfield, Palmer Lake, and Pitkin begun. An extension of the Black Canyon of the Gunnison National Monument continued and the Tenmile mining district begun. In cooperation with the city of Denver, the 7½' quadrangles Box Elder, Indian Hills, Littleton, Parker, Pine Ridge, Senac Ranch, and Scranton completed.

Connecticut.—The 7½' quadrangles Essex completed and Deep River begun.

District of Columbia.—The revision of Washington and vicinity (D. C.-Md.-Va.) begun.

Florida.—The 15' quadrangles Arran and Tallahassee completed and Wetumpka begun.

Georgia.—The 15' quadrangles Adairsville, Waleska, and the Pine Log area continued. In cooperation with the Tennessee Valley Authority, the 7½' quadrangles Culberson, Gumlog, and Ivylog begun.

Idaho.—The Wallace special area completed and the 15' quadrangle Blackfoot begun.

Illinois.—The 15' quadrangles Cissna Park and Fithian completed and Rose Hill resumed. In cooperation with the Illinois Department of Registration and Education, Geological Survey, the 15' quadrangles Freeport, Ina, and Mulberry Grove completed and Carmi, Forreston, Galva, Mount Carroll, and St. Elmo resumed.

Indiana.—The 7½' quadrangles Seeleyville, Marshall Southeast, and Marshall Northeast completed. In cooperation with the Indiana Department of Conservation, the 7½' quadrangles Brooksburg, Otterbein Northeast, Sullivan Northeast, Sullivan Northwest, Turkey Lake Northeast, Turkey Lake Northwest, Turkey Lake Southeast, Vevay North, and Vevay South completed and Merom Northeast, Rising Sun Southwest, Rising Sun Southeast, and Sullivan Southeast begun.

Iowa.—The 15' quadrangles Centerville (Iowa-Mo.) and Forbush completed and Seymour begun.

Kansas.—The 15' quadrangles Modoc, Sandon, and Pence and the 7½' quadrangle Sandon Northwest completed and the 15' quadrangle Terryton begun. In cooperation with the Kansas Geological Survey, the 15' quadrangle Severy and the 7½' quadrangles Sedgwick Southeast, Sedgwick Southwest, and Wichita Northwest completed and Wichita Southwest begun.

Kentucky.—The 7½' quadrangles Hico and New Concord completed and Fenton and Rushing begun.

Louisiana.—The 15' quadrangles Bayou du Large and Lake Charles completed. In cooperation with the Louisiana State Board of Engineers, planimetric maps completed for the 7½' quadrangles Arnsburg, Bossier Point, Cannisia Lake, Elm Grove, Forbing, Heflin, Kingston, Koran, Mansfield, Naborton, Nicholson Northeast, Nicholson Northwest, Nicholson Southwest, Nicholson Southeast, Ringgold, Varnado Northeast, Varnado Northwest, Varnado Southwest, Varnado Southeast, and Wallace Lake and the 15' quadrangle Franklinton begun.

Maine.—The 15' quadrangles Amity and Danforth completed. In cooperation with the Maine Public Utilities Commission, the 15' quadrangles Oquossoc and Sebec begun.

Maryland.—The 15' quadrangles Elkton (Md.-Del.-Pa.) and Havre de Grace (Md.-Pa.) completed.

Massachusetts.—The 7½' quadrangles Attleboro (Mass.-R. I.), East Providence (Mass.-R. I.), and Westport completed. In cooperation with the Massachusetts Department of Public Works, Division of Waterways, the 7½' quadrangles Belchertown, Billerica, Brewster, Chatham, Dennis, Harwick, Lowell, Monomoy Point,

Shutesbury, Tyngsboro, and Westford completed and Concord, Framingham, Maynard, Natick, and Orleans begun.

Michigan.—The 15' quadrangles Dundee and Blissfield and the 7½' quadrangle Rattle Run completed and the 7½' quadrangle Ypsilanti East begun. In cooperation with the Michigan Highway Department, the 7½' quadrangles Dearborn, Estral Beach, Inkster, Redford, and Royal Oak completed and Flat Rock, Monroe, Stony Point, Wayne County Airport, and Wyandotte begun. In cooperation with the Michigan Department of Conservation, planimetric maps for the 7½' quadrangles Carvers Gap, Graveraet River, Laurium, Point Mills, Red Ridge, Rice Lake, and Traverse Island completed and for the 15' quadrangles Houghton and Winona begun.

Minnesota.—The 15' quadrangles Drayton (Minn.-N. Dak.), Hallock, Kennedy, and Pembina (Minn.-N. Dak.) completed.

Mississippi.—The 15' quadrangles Oxford completed and Denmark continued.

Missouri.—The 15' quadrangles Acorn, Farragut (Mo.-Iowa), and Hamburg (Mo.-Iowa) completed and Coin (Mo.-Iowa) begun. In cooperation with the Missouri Geological Survey and Water Resources, the 15' quadrangles Blockton (Mo.-Iowa), Bolckow, Brussels (Mo.-Ill.), Long Lane, Mineola, Noel, Protom, Skidmore, Stansberry, and Wellsville and the 7½' quadrangles Dederick, Deerfield (Mo.-Kans.), Harwood, Humansville, Hume Southeast (Mo.-Kans.), Moundsville, Richards (Mo.-Kans.), and Sprague completed, the 15' quadrangle Gentry continued, the 15' quadrangles Mountain, Salem, and Stone Hill resumed, and the 15' quadrangles Bedford, Florida, Marshall, Maryville, and Parnell and the 7½' quadrangles Iconium, Lowry City and Weaubleau begun.

Montana.—The 15' quadrangles Nye Northwest and Sunburst completed and Mount Cowen Northwest and Mount Douglas begun.

Nebraska.—The 15' quadrangle Red Cloud and Republican River, sheets Nos. 8, 9, 10, 11, 12, 13, 14, and 15 completed.

Nevada.—The 15' quadrangles Cosgrave and Owyhee completed and Antler Peak begun.

New Jersey.—The 7½' quadrangles Bridgeport (N. J.-Pa.), New Brunswick, and Nyack (N. Y.-N. J.) completed.

New Mexico.—The 15' quadrangles La Ventana, Queen Northeast, and Queen Southeast completed, Nacimiento Peak continued, and Tererro begun.

New York.—The 15' quadrangles Plattsburg (N. Y.-Vt.), Rouses Point (N. Y.-Vt.), and Willsboro (N. Y.-Vt.) completed. In cooperation with the New York Department of Public Works, the 7½' quadrangles Syracuse completed and Brewerton and Cicero begun.

North Carolina.—The 15' quadrangles Raleigh completed, Durham South begun, and Cape Hatteras National Park continued. In cooperation with the Tennessee Valley Authority, the 7½' quadrangles Alarka, Bryson, Bunches Bald, Clyde, Cove Creek Gap, Delwood, Fontana, Greens Creek, Hepco, Hewitt, Ivylog, Judson, Proctor, Ravenford, Robbinsville, Santeetlah Creek, Tapoco (N. C.-Tenn.), Wesser, and Whittier completed and Canton and Sandymush begun.

North Dakota.—The 15' quadrangles Bathgate, Cavalier, Drayton (N. Dak.-Minn.), Glasston, Pembina (N. Dak.-Minn.), and Selz completed.

Oklahoma.—The 15' quadrangles Geary and Red Oak completed and the 7½' quadrangles El Reno Southwest and El Reno Southeast begun.

Oregon.—The 15' quadrangles Cape Foulweather and Yaquina completed and Canyon City Northeast, Canyon City Northwest, Izee Northeast, and Izee Northwest begun.

Pennsylvania.—The 7½' quadrangle Lansdowne completed. In cooperation with the Pennsylvania Department of Internal Affairs, Topographic and Geologic Survey, the 15' quadrangles Orbisonia and Sayre completed, the Brockwayville begun, and the cultural revision for the 15' quadrangles Curwensville, Houtzdale, and Philipsburg completed.

Puerto Rico.—In cooperation with the Commissioner of the Puerto Rico Department of the Interior, the 7½' quadrangles Bayamon, Carolina, Hormigueros, Rio Grande, and San Juan completed and Arecibo, Barceloneta, Manati, and Vega Alta begun.

Rhode Island.—The 7½' quadrangles Bristol, Newport, and Prudence Island completed.

South Carolina.—The 15' quadrangles Florence and Timmons ville completed and Marion begun.

South Dakota.—The 15' quadrangles Crow Lake, Lyonville, and Tinton and vicinity (S. Dak.-Wyo.) completed and the 15' quadrangle Iona begun.

Tennessee.—The 7½' quadrangles Baileytown, Bearden, Cave Creek, Concord, Hartford, Jones Cove, Knoxville, Lemon Gap (Tenn.-N. C.), Louisville, Lovell, Maryville, Neddy Mountain, Philadelphia, Pigeon Forge, Richardson Cove, Shooks Gap, Walden Creek, Waterville (Tenn.-N. C.), and Wildwood completed and Blockhouse begun. In cooperation with the Tennessee Valley Authority, the 7½' quadrangles Bacon Gap, Bethel Valley, Binfield, Boyd Creek, Calderwood, Cartertown, Cedar Creek, Chattanooga, Chattanooga East, Elverton, Gatlinburg, John Sevier, Johnson City, Kykers Ferry, Lake Davy Crockett, Lenoir City, Loudon, Meadow, Newport, Parrottsville, Pattie Gap, Rockwood, Spring City, Ten Mile, and Wear Cove completed and Carters Creek, Godwin, Harri man, Kinzel Springs, Madisonville, Ooltewah, Tallassee, and Venore begun.

Texas.—The 15' quadrangles Big Spring North and Borego Tank completed.

Utah.—The 15' quadrangle Soldier Summit completed.

Vermont.—The 15' quadrangles Plattsburg (N. Y.-Vt.), Rouses Point (N. Y.-Vt.), and Willsboro (N. Y.-Vt.) completed and Plainfield begun.

Virginia.—The 15' quadrangles Lake Drummond (Va.-N. C.) and Moyock (Va.-N. C.) completed and Back Bay (Va.-N. C.) begun. In cooperation with the Virginia Conservation Commission, the 15' quadrangles Berryville (Va.-W. Va.), Hightown (Va.-W. Va.), and Rustburg completed, Clarksville continued, and Orkney Springs (W. Va.-Va.) begun.

Washington.—The 15' quadrangle Mount Spokane (Wash.-Idaho) completed. In cooperation with the Director of the Washington Department of Conservation and Development, the 15' quadrangles Boylston and Reardan Northeast completed and Reardan Southeast begun.

Wisconsin.—The 15' quadrangles Maiden Rock (Wis.-Minn.) and Menomonie completed. In cooperation with the Wisconsin Highway Commission, planimetric maps for the 15' quadrangles Cassian, Dunbar, Florence, Goodman, Iron Mountain, Iron River, Laona, Long Lake, Norway, and Pembine completed, for Pike Lake continued, and for Brantwood, Monico, and Rhinelander begun.

Wyoming.—The 30' quadrangle Big Piney and Fossil special completed and Superior mining district begun.

WATER RESOURCES BRANCH

Comprehensive information concerning the quantity, chemical quality, and availability of both surface and ground waters becomes more important each year. The growth of the country, with con-

sequent increases in uses of water for many and varied purposes, and the recent widespread and disastrous droughts and floods have emphasized the dependence of the physical and economic well-being of the Nation upon use and control of water. The Water Resources Branch collects and publishes data that are prerequisite for orderly and wise development of domestic, municipal, and industrial water supplies; for irrigation and navigation projects; and for flood protection, recreational uses, air conditioning, wild-life conservation, water-power development, and measures for control of pollution. Expansions of many industrial activities in connection with preparations for National defense will present additional problems in water supplies, which should be anticipated and provided for in advance of the time of actual need.

The appropriation for stream gaging for 1940 provided \$1,143,000 for the investigation of water resources. Of that amount, \$900,000 was available only for cooperation with States or municipalities. As set forth below, the collection and compilation of water data are carried on in cooperation with Federal bureaus, States, and municipalities, and with permittees and licensees of the Federal Power Commission. The aggregate expenditures during the year exceeded \$3,000,000.

Federal bureaus.—Investigations were conducted for the following Federal bureaus, which made available nearly \$1,000,000 to cover the cost: The Mississippi River Commission and the Office of the Chief of Engineers, War Department; the Tennessee Valley Authority; the Flood Control Coordinating Committee, the Soil Conservation Service, and the Weather Bureau, Department of Agriculture; the Bureau of Biological Survey, the Bureau of Reclamation, the Grazing Service, the Division of Territories and Island Possessions, the National Park Service, and the Office of Indian Affairs, Department of the Interior; the Bureau of Prisons, Department of Justice; the Department of State; the Federal Power Commission; and the National Resources Planning Board.

States.—The total amount contributed by States and municipalities for cooperative water-resources investigations was approximately \$953,000. Additional data and records furnished by private organizations and individuals had an estimated value of \$245,000.

Permittees and licensees of the Federal Power Commission.—At the request of the Federal Power Commission, 29 engineers of the Branch have been designated as representatives of the Commission in the conduct of such field work as may be assigned to them by the Commission. These engineers have supervised the operation of 168 projects under permits and licenses of the Commission. About 293 gaging stations were operated by the Branch or by permittees and licensees

under the supervision of the Branch in connection with 125 projects of the Commission. The permittees and licensees furnished about \$76,000 for this work.

Division of Surface Water.—The Division of Surface Water, functioning through 37 district offices, was engaged primarily in the collection of daily records of stream flow at river-measurement stations, of which 3,910 were in operation at the end of the year in all the States except Delaware, in the District of Columbia, and in Hawaii. Records of stages only were obtained at 27 additional river stations, and records of flow were obtained at 435 gaging stations on canals and ditches. Records of stages were obtained at 389 stations on lakes and reservoirs where information regarding water storage and water utilization was of particular value. On June 30, 4,761 gaging stations were in operation, 3,534 of which were equipped with water-stage recorders. Records for 144 additional gaging stations were received from Federal bureaus and from individuals. A total of 60,627 discharge measurements were made at gaging stations, and 5,351 miscellaneous discharge measurements were made at other places. In this work, 45 States, the Territory of Hawaii, and several Federal bureaus cooperated.

Fifteen reports containing records of the flow of streams in various sections of the United States and in Hawaii were completed for publication as water-supply papers. Thirty-one technical papers relating to surface water were prepared.

An expanded program of construction and operation of river-measurement stations was carried on during the year in cooperation with the Office of the Chief of Engineers, War Department, in connection with its flood-control investigations and the maintenance and improvement of existing river and harbor works. A new program of lesser magnitude was started in cooperation with the Flood Control Coordinating Committee of the Department of Agriculture. Both programs are to be continued during the 1941 fiscal year.

Designs of artificial-control structures for stabilizing stage-discharge relations at river-measurement stations were tested at the National Hydraulic Laboratory of the National Bureau of Standards. Tests were made of one-sixth scale models for the purpose of extending to higher heads and greater depths of water the findings previously obtained with full-size models. Tests were also made of structures designed for use as artificial controls in streams that have shifting beds and that carry large quantities of debris at flood stages. Laboratory determinations of stage-discharge relations for two gaging stations at which it was impracticable to obtain current-meter measurements at high stages were used to supplement the results of measurements made in the field.

Studies were made in the National Hydraulic Laboratory to ascertain the position that should be taken by the engineer in making discharge measurements by wading, in order to avoid or minimize the possibility of affecting the velocity of the water passing the current meter. Similar investigations were made at gaging stations on several rivers in New Jersey as an extension of the laboratory studies to field conditions. These research investigations will lead to improvements in methods of field work, with a resulting increase in accuracy and efficiency of operation.

Division of Ground Water.—The Division of Ground Water investigates the waters that lie below the surface in the zone of saturation, from which wells and springs are supplied; the source, occurrence, quantity, and head of these waters; their conservation; their availability and adequacy for domestic, industrial, irrigation, and public supplies and as watering places for livestock and desert travelers; and the methods of constructing wells and recovering water from them and of improving springs. The constantly increasing use of water supplies from wells is causing a greater demand each year for intensive studies of the quantities of ground water that are perennially available.

During the year about 85 technical reports or papers relating to ground water were released to the public, and 28 technical papers were presented by members of the Division before scientific societies or other organizations.

Periodic measurements of water levels or artesian pressure were made in about 5,500 observation wells, on about 265 of which recording gages were maintained. The report on water levels and artesian pressure in observation wells in the calendar year 1938 was published as Water-Supply Paper 845, and a similar report for 1939 is in press as Water-Supply Paper 886. Tests on 44 water-bearing materials were made in the hydrologic laboratory.

Work was done in 38 States and in Hawaii and the District of Columbia, nearly all in cooperation with Federal, State, Territorial, or local governmental agencies.

WORK OF THE YEAR, BY STATES

In Alabama an investigation of ground water was begun in the Cretaceous area of the Coastal Plain. In Arizona investigations were begun, chiefly in the Gila River Basin. A report on ground-water recharge from floodwaters of Queen Creek was released to the United States Army engineers. In Arkansas studies were continued in the Grand Prairie region, and a report was made to the State geologist on the water-well survey of the Work Projects Administration. In California an investigation was begun in the coastal area of Orange and Los Angeles Counties, and water levels were measured in observa-

tion wells in several areas. A report on the geology and ground-water hydrology of the Mokelumne area, California, was published as Water-Supply Paper 780. In Colorado investigations and reports were made on prospective well sites on the public lands in the western part of the State. In Connecticut work was continued on water levels in observation wells, and reports were prepared on the New Haven area and on the area in the vicinity of the Federal Correctional Institution at Danbury. In the District of Columbia a survey was made of ground-water pumpage, and periodic measurements were started on several observation wells. In Florida investigations were continued in the Jacksonville area; work was started in the Miami and Pensacola areas; and a summary on ground-water resources of the Pensacola area was released. In Georgia investigations were continued in the Savannah area and other parts of the Coastal Plain, and a report was released on the artesian water in the coastal area. In Hawaii work was continued on several of the islands; the geophysical phases of the studies were completed; and several papers on ground water were released.

In Idaho periodic measurements of water levels were made in several observation wells. In Indiana work was continued in the Indianapolis area and on the State-wide observation-well program. In Iowa work was continued on State-wide ground-water studies and on a study of the effects of soil conservation on ground-water levels in the Tarkio Basin. In Kansas work was continued in the Wichita and other areas; a large program of new work was started in the western part of the State; and several papers relating to ground water were released. In Louisiana investigations were continued, chiefly in Grant, LaSalle, Acadia, and Jefferson Davis Parishes. Several papers on ground water were released, and a report on the ground-water resources of Rapides Parish was published by the State Geological Survey as Bulletin 17. In Maryland periodic measurements were made of water levels in several observation wells. In Massachusetts work was continued on a small scale on ground-water studies and measurements of observation wells. In Michigan work was continued on the observation-well program. In Mississippi work was continued in the alluvial plain of the Mississippi Valley and in the coastal area. In Missouri water levels were measured in several wells in the Tarkio Basin. In Montana the observation-well program was continued on the lowlands at the head of Flathead Lake. In Nebraska work was continued on State-wide investigations, and several reports were released. In Nevada a brief investigation and a report were made on the Ruby Valley. In New Jersey observations and studies were continued in several areas. In New Mexico studies were continued in the principal ground-water areas, and 6 reports were published by the State Engineer. In New York observations and studies were continued on Long Island. In North Carolina a study of methods of developing wells was continued at Elizabeth City, also the program of water-level measurements in wells in different parts of the State. In North Dakota the observation-well program was continued, and work was begun in the Fargo and other areas. In Ohio work was continued in Hamilton and Butler Counties, in the Cincinnati area, and a report on the area was released. In Oklahoma work was continued, chiefly in the Panhandle, and several reports were released. The report on the geology and ground-water resources of Texas County was published by the State Geological Survey as Bulletin 59. In Oregon work was continued in different areas, and several reports were released to the United States Army engineers. A report on the geology and ground-water resources of the Harney Basin was published as Water-Supply Paper 841.

In Pennsylvania the observation-well program was continued, and a report on ground water in north-central Pennsylvania was published by the State Topographic and Geologic Survey as Bulletin W 6. In South Carolina studies were continued on the ground-water levels in the Tiger River area. In South Dakota work was begun on a program of observation wells. In Tennessee records were obtained of the current pumpage and water levels in observation wells in Memphis. In Texas work was continued in many areas, new work was begun in the Pecos River Basin, and a number of ground-water reports were released. Records of wells and springs in 20 counties were mimeographed by the Work Projects Administration. In Utah a State-wide observation-well program and studies in the Cedar City area were continued, and several reports were released. A report on artesian water levels and interference between artesian wells in the vicinity of Lehi was published as Water-Supply Paper 836-C. In the Virgin Islands a report was in preparation on the Island of St. Croix. In Virginia work was continued in the southern part of the Coastal Plain. In Washington studies were continued on a State-wide program and in the Tacoma and Bremerton areas. In Wisconsin records were obtained of water levels in several observation wells.

Division of Quality of Water.—The Division of Quality of Water analyzes water from surface and underground sources with reference to its suitability for industrial and agricultural uses and for domestic use (not related to questions of health) so far as such use is affected by the dissolved mineral matter. During the year, analyses were made in Washington of 2,255 samples of water from surface and underground sources. The analyses included many made for cooperative studies of ground water in the different States and for special investigations of water supplies for specific projects. During the year, 10,921 samples were examined by or under the technical supervision of the Division of Quality of Water in field laboratories at Miami, Fla., Roswell, N. Mex. (substation at Albuquerque), and Austin and Pecos, Tex. At Boise, Idaho, the silt content was determined for 32,471 samples from the Boise River and its tributaries. The silt content of 7,850 samples from streams in or near projects of the Soil Conservation Service of the Department of Agriculture was determined in field laboratories at Shenandoah, Iowa (Tarkio, Mo., project), High Point, N. C., Pullman, Wash., and LaCrosse, Wis.

Studies of suspended and dissolved matter of the Colorado River and its tributaries were continued. Tables of analytical data for Colorado River gaging stations at which samples were collected through the water year 1938-39 (Grand Canyon and Willow Beach gaging stations for part of the 1940 water year) were filed with the Survey offices at Denver, Colo., Los Angeles, Calif., Salt Lake City, Utah, San Francisco, Calif., and Tucson, Ariz. Tabulations of analyses of samples from different depths at several points in Lake Mead were furnished to the Bureau of Reclamation. An intensive study of the chemical character of the water of the Pecos River in New Mexico, which was begun in cooperation with the State Engineer

of New Mexico in 1937, was continued as a part of the joint investigation of the Pecos River Basin under the auspices of the National Resources Planning Committee and was extended to cover the part of the river basin in Texas. Field studies were made of the sources of saline water in the basin. Analyses of composites of daily samples of surface water and analyses of single samples of surface water and of ground water were tabulated and made currently available at the laboratories in Roswell, N. Mex., and Pecos, Tex., where the analyses were made.

Tables of records of precipitation, discharge, and suspended matter at gaging stations on four demonstration projects of the Soil Conservation Service, Department of Agriculture, for the year ending September 30, 1939, were released to the Soil Conservation Service. Studies of silt movement in streams in the Boise River Basin in Idaho and in the St. Francis River Basin in Missouri were made for the Flood Control Coordinating Committee of the Department of Agriculture, and preliminary reports on the measurements of discharge and suspended matter were released for the period January through September 1939 for the Boise River Basin and for the period February through September 1939 for the St. Francis River Basin.

Close cooperation was continued with the Division of Ground Water in the study of problems relating to quality of ground water and in the preparation of the parts of ground-water reports that involve consideration of the chemical character of the waters. Miscellaneous water analyses were made for the Department of Agriculture, the Department of Commerce, the Navy Department, and the Securities and Exchange Commission. The division furnished information and advice on problems relating to quality of water to the Biological Survey, the Bureau of Reclamation, and the National Park Service, of the Department of Interior; also to the Bureau of Foreign and Domestic Commerce, the Bureau of Plant Industry, the Federal Housing Administration, the Federal Trade Commission, the Food and Drug Administration, the National Bureau of Standards, the National Institute of Health, the National Resources Planning Board, the Navy Department, the Netherlands Legation, the Public Health Service, the Public Works Administration, the Reconstruction Finance Corporation, Office of the Chief of Engineers, the United States Travel Bureau, the National Geographic Society, and to numerous companies and individuals. Twelve technical papers relating to quality of waters were prepared for publication in journals or for presentation before scientific societies or other organizations.

Division of Water Utilization.—The Division of Water Utilization conducts hydrologic studies and compiles data relating to the utilization and control of the waters of streams. It supervises

studies of hydrologic problems made by the field personnel of the branch and serves in an advisory capacity in the administration and conduct of various water-resources investigations and related governmental activities.

The collection of stage and discharge data relating to outstanding floods and miscellaneous studies of water resources in several of the district offices of the branch were supervised and coordinated, and the work of assembling data and general information on floods was continued. Projects involving compilations of information on topographic characteristics of drainage basins that may relate to determination of flood flows were supervised. The initiation and conduct of some of these projects were sponsored by the Public Works Administration and the Work Projects Administration. Studies were made of the surface-water hydrology of the demonstration projects of the Soil Conservation Service, Department of Agriculture, in connection with the work in which the Survey has been cooperating for several years.

Methods of analyzing relationships between rainfall and run-off with a view to developing a standard method of analysis were studied in collaboration with the Office of the Chief of Engineers of the War Department and several bureaus of the Department of Agriculture. Investigations of the water problems along the international boundary between the United States and Canada have been continued for the State Department and the International Joint Commission. Numerous papers and discussions on hydrologic and hydraulic subjects were contributed to technical and scientific journals.

The following Water-Supply Papers were prepared for publication during the year, and other reports are in various stages of preparation:

843. Floods of December 1937 in northern California, by H. D. McGlashan and R. C. Briggs.

844. The floods of March 1938 in southern California, by F. C. Ebert and H. C. Troxell.

846. Natural water loss in selected drainage basins, by G. R. Williams and others.

847. Maximum discharges at stream-measurement stations through December 31, 1937, by Gordon Williams and Lawrence Crawford, with a supplement including additions and changes through September 30, 1938, by W. S. Eisenlohr, Jr.

867. Hurricane floods of September 1938, by C. G. Paulsen and others.

Division of Power Resources.—The Division of Power Resources collects and compiles information on developed and potential water power of the United States. Information on water-power developments is obtained through the cooperation of the field engineers of the Division of Surface Water and the Federal Power Commission.

During the year a report on the construction of water-power plants in different countries of the world during 1939 was compiled with the cooperation of the Bureau of Foreign and Domestic Commerce of the Department of Commerce for publication in the Encyclopedia Britannica's 1940 Book of the Year. Reports on construction of water-power plants were received from 44 countries in time to be included in the report. Reports continue to come in from other countries, and to date about 70 countries have reported. Owing to present war conditions probably no attempt will be made to obtain reports of power-plant construction in foreign countries in 1940.

A compilation was made of the capacity of water wheels and water-power plants previous to 1921, the date of the Geological Survey's first comprehensive report of the capacity of water wheels in the United States by States. The compilation included reports of capacity of water wheels for 1869, 1879, 1902, 1912, and 1917. The statistics on developed water power for each of those years were based on census reports of manufactures for 1869, 1879, 1889, 1904, 1909, 1914, and 1919, reports of electrical industries for 1902, 1907, 1912, and 1917, and reports of mines and quarries, drainage and irrigation for various years. The figures for total capacity of water wheels by States for selected years from 1869 to 1917, with the records already published beginning with 1921 and continuing to date, will give a complete picture of the water-power development in the United States for the past 70 years and will be a valuable addition to information now available.

CONSERVATION BRANCH

The work of the Conservation Branch involves surveys and investigations for an inventory of the water and mineral resources of the public domain, supervision of private operations for development of power and production of minerals from public and Indian lands and naval petroleum reserves, and supplying information and advice to numerous land-administrative agencies of the Government.

These activities were maintained throughout the year but not on the comprehensive and detailed scale that the work warranted, owing to inadequate funds. The amount of field supervision required, which has become greater each year, again increased materially. On public land alone 235 operating properties were added to the number under supervision. Mineral production during the year from public and Indian lands and naval petroleum reserves under supervision had an estimated value of \$80,000,000, and the revenue accrued therefrom amounted to about \$8,000,000. Compared with this substantial revenue, the cost of supervision is small.

In addition to their regular activities members of the Branch were engaged in conservation work on related Public Works projects.

MINERAL CLASSIFICATION DIVISION

The office activities of the Mineral Classification Division were directed largely to determining the areas subject to inclusion in plans for unit or cooperative development submitted by holders of Government oil and gas prospecting permits and leases; to consideration of permits in such plans subject to leases; to consideration of oil and gas leases to be exchanged for outstanding oil and gas prospecting permits; to action on applications for rights-of-way over public lands for irrigation works, oil and gas pipe lines, highways, and other purposes; to preparation of reports on initial applications for oil and gas leases; to determination of interests in Federal land included in assignments recommended for approval by the Department; and to classifying lands as to their mineral character, including coal, oil, and gas, that are embraced in applications for surface rights under the non-mineral public-land laws.

For mineral classification, information was obtained on the occurrence of coal in New Mexico, Utah, Washington, and Wyoming; of oil and gas in Montana, New Mexico, Oklahoma, South Dakota, and Wyoming; and of phosphate in Idaho, Montana, Utah, and Wyoming. Geologic conditions were examined at 5 dam sites in Oregon and 1 dam site in Washington.

In the work of the Division, 7,118 cases requiring technical consideration were disposed of during the year; 820,782 acres in New Mexico and 251,251 acres in Utah were restored from coal withdrawals; and 128,165 acres in Utah were classified as coal land and 188,349 acres as noncoal land. In addition, a revision of the definitions of the known geologic structure of 12 producing oil and gas fields and the initial definition of 12 new fields were prepared and promulgated.

The aggregate area of the outstanding definitions of the known geologic structure of oil and gas fields on June 30, 1940, amounted to 1,378,526 acres in California, Colorado, Montana, New Mexico, North Dakota, Oklahoma, Utah, and Wyoming.

WATER AND POWER DIVISION

The work of obtaining basic information on the water-power resources and storage possibilities of public lands and of making it available for use in the administration of public-land laws and to Federal and other agencies engaged in planning, constructing, and operating water-power projects was continued in the field but on a decreased scale owing to exhaustion of the funds made available by

the Public Works Administration. River-utilization surveys covering 165 miles of streams and tributaries and detailed surveys at 11 dam sites were made. Surveys of mineral leaseholds embracing an area of 4 square miles were completed. Preparation of reports on geologic conditions at dam sites examined in the field during the preceding year and an experimental geophysical examination of one potash leasehold were continued.

Office activities included action resulting in the addition of 18,598 acres to outstanding water-power reserves in 12 public-land States and the elimination of 23,685 acres from such reserves in 5 States, with a net decrease in the total reserved area in 22 States and Alaska to 6,685,489 acres. The addition of 2,524 acres to reservoir-site reserves made a total of 137,172 acres withdrawn. Field supervision, in conjunction with the Water Resources Branch, of power projects for the Federal Power Commission involved supervision of construction and operation on 160 projects, continuation of studies of cost accounting on 9 of these projects, and investigations and reports on 3 of the projects. Field supervision of power projects holding permits and grants from the Department of the Interior involved 216 projects.

MINING AND OIL- AND GAS-LEASING DIVISIONS

The work of the Mining and Oil- and Gas-leasing Divisions consists of inspectional and regulatory supervision of mineral prospecting and development on public and Indian lands and naval petroleum reserves.

The Mining Division is charged with supervision of all operations for the discovery and development on public land of deposits of coal, potassium, sodium, phosphate, and oil shale; in New Mexico and Louisiana of sulfur; on certain land grants of gold, silver, and mercury; and on restricted, allotted, and tribal Indian lands of all minerals except oil and gas. This supervisory and regulatory work during the fiscal year was accomplished through six field offices at Denver, Colo., Billings, Mont., Carlsbad, N. Mex., McAlester and Miami, Okla., and Salt Lake City, Utah, and through a cooperative agreement approved May 4, 1935, with the Department of Mines, Territory of Alaska.

The work of the Oil- and Gas-leasing Division includes inspectional and regulatory supervision of all operations for the discovery, development, and production of petroleum and natural gas on public land of the United States, on naval petroleum reserves, and on all Indian land subject to departmental jurisdiction, both tribal and allotted, except the Osage Reservation, Okla. The work was accomplished during the year through 16 field offices and suboffices at Los Angeles and Taft, Calif., Roswell and Farmington, N. Mex., Tulsa, Oklahoma City, Ardmore, Holdenville, and Drumright, Okla., Den-

ver, Colo., Casper, Midwest, and Thermopolis, Wyo., Billings and Great Falls, Mont., and Salt Lake City, Utah.

Public land.—The number of public-land properties under supervision of the Mining Division at the end of the year was 684, an increase of 1 since June 30, 1939. Coal properties in 14 States and Alaska decreased 8, to 567; potash properties in 2 States decreased 7, to 21; sodium properties in 7 States increased 32, to 78; phosphate properties in 3 States were again 7; sulfur properties in 1 State decreased 16, to 11. The decrease in coal properties resulted indirectly from the Secretary's instructions of January 24, 1934, and that in potash properties from the Secretary's Order No. 914 of April 5, 1935. The Secretary's Order No. 1294 of July 2, 1938, restricted further issuance of phosphate leases and permits. In prospecting for the above-named minerals 21 boreholes were drilled during the year.

Accidents to employees working in mines under departmental lease are generally fewer than in competitive mines not on Government land, and of the 70 awards to coal and potash mines made by the Joseph A. Holmes Safety Association for the calendar year 1939, 8 were made to departmental lessees. The use of safety appliances and safety clothing is increasing generally throughout mines on Government land.

The number of public-land properties under supervision of the Oil and Gas-leasing Division decreased about 24 percent, to a total of 6,504, involving 8,055,845 acres in 20 States and Alaska. Drilling activity on public land during the fiscal year included the commencement of 468 new wells and the completion of 472 wells, of which 361 were rated as productive of oil and gas and 111 as barren. The total number of public-land wells under supervision on June 30, 1940, was 9,338, including 4,779 capable of oil or gas production. Production of petroleum from public land in the fiscal year 1940 was about 5 percent more than in the preceding year; production of gas decreased about 9 percent; and production of natural gasoline increased about 7 percent.

The Division continued to assist in the preparation of unit or cooperative plans of operation and development and in reviewing and revising the engineering and royalty features of such plans after their submission. At the end of the year a total of 1,680 plans of unit or cooperative development for oil or gas pools, fields, or areas involving public land had been filed with the Geological Survey, of which 120 had been given final approval by the Secretary of the Interior, 1,554 had been rejected, withdrawn, or suspended, and 6 were pending final action. During the year 15 unit agreements were filed, 36 acted upon, and 9 approved by the Secretary of the Interior.

Indian land.—The number of Indian-land properties under supervision of the Mining Division during the year was 241 in 12 States. These properties involved 42 lead and zinc leaseholds in the Quapaw Reservation, Okla., with aggregate royalty accruals of \$610,359.77, an increase of 16 percent over that of the preceding year; 51 coal leaseholds on segregated Choctaw and Chickasaw land and restricted allotted land in Oklahoma, with an aggregate production that increased from 268,503.78 tons in 1939 to 355,350.56 tons in 1940, and revenue accruals from royalties, bonuses, and sale of coal lands amounting to \$46,332.60; 1 leased purchased tract, 1 unleased purchased tract, and 1 asphalt lease on segregated land in Oklahoma and 138 properties in 11 Western States, of which 14 were agency coal mines, 24 coal leases, 49 individual Indian coal mines, and 51 metalliferous leases and nonmetalliferous leases other than coal leases.

Oil and gas supervision involved 4,519 leaseholds, 4,332 wells, and aggregate bonus, royalty, and rental accruals estimated at \$2,000,000 for Indian beneficiaries in 8 States and 33 different tribes. The cooperative duties involved royalty accounting; appraisals of bonuses, royalty offers, and pollution damages; assistance to lessees of Indian land on operating problems; and assistance to agency officials and tribal councils on technical phases of leasehold development and administration.

Naval Petroleum Reserves.—On behalf of the Navy Department supervision was continued during the year over operations for the production of oil and gas within Naval Petroleum Reserves Nos. 1 and 2, in California, and for the conservation of shut-in production within Naval Petroleum Reserve No. 3, in Wyoming. Production from 286 wells on the reserves aggregated 3,832,002 barrels of petroleum, 2,295,023,000 cubic feet of natural gas, and 10,118,638 gallons of natural gasoline and had an aggregate royalty value of \$938,499.86.

PUBLIC WORKS PROJECTS

Under the supervision of the personnel of the Conservation Branch, expenditures aggregating \$14,352.72 were made during the year from Public Works funds allotted for field investigations and conservation work. On 10 projects \$9,303.92 was expended for river-utilization surveys of power and storage resources of important streams in 10 States. On 3 projects, \$5,048.80 was expended in 3 States to plug and abandon or condition for use as a source of water numerous wells that had been drilled for oil and gas on public land and improperly abandoned or merely deserted, and to fill, bulkhead, or otherwise safeguard abandoned mines or openings on Indian land.

SUMMARY OF FIELD ACTIVITIES, BY STATES

Alabama.—Supervised one lease and one prospecting permit for coal and one lease for oil and gas on public land.

Alaska.—Supervised 1 power project, 2 leases, 7 prospecting permits, and 3 licenses for coal, and 13 leases and 101 prospecting permits for oil and gas on public land.

Arizona.—Investigated 1 water-power site. Supervised 19 power projects, 1 prospecting permit for coal and 2 for sodium, and 8 prospecting permits for oil and gas on public land, and 6 agency coal mines, 6 asbestos leases, 1 gold lease, and 1 guano lease on Indian land.

Arkansas.—Examined one tract in Pike County for mineral classification. Supervised one power project.

California.—Supervised 109 power projects, 2 prospecting permits for coal and 33 for sodium, 1 sodium lease, 6 potash leases, and 690 leases and 227 prospecting permits for oil and gas on public land, 1 coal lease and 3 gold leases on Indian land, and 22 oil and gas leases on naval petroleum reserves.

Colorado.—Supervised 12 power projects, 87 leases, 19 prospecting permits, and 8 licenses for coal, 1 sodium lease, and 201 leases and 268 prospecting permits for oil and gas on public land and 2 coal leases on Indian land. Surveyed 12 linear miles of river basin.

Idaho.—Supervised 45 power projects, 2 leases and 6 prospecting permits for coal, 1 phosphate lease, and 17 leases and 22 prospecting permits for oil and gas on public land and 1 limestone lease on Indian land. Examined 5 dam sites for geologic conditions. Surveyed 12 linear miles of river basin and 4 dam sites.

Kansas.—Supervised 32 leases and 2 prospecting permits for oil and gas on public land and 5 leases for oil and gas on Indian land.

Louisiana.—Supervised 63 leases for oil and gas on public land.

Michigan.—Supervised one lease for oil and gas on public land and seven leases for oil and gas on Indian land. Investigated one water-power site.

Mississippi.—Supervised one power project.

Montana.—Investigated an occurrence of phosphate near Monida, Beaverhead County. Supervised 60 power projects, 88 leases, 11 prospecting permits, and 41 licenses for coal, 5 phosphate leases, and 427 leases and 241 prospecting permits for oil and gas on public land and 3 agency coal mines, 7 coal leases, 9 coal permits, 4 silver-lead-gold leases, 1 bentonite lease, and 45 leases for oil and gas on Indian land. Examined 2 applications for complex-metal leases and 1 group of complex-metal mining claims on Indian land. Surveyed 23 linear miles of river basin and 2 dam sites.

Nebraska.—Supervised one lease for oil and gas on public land.

Nevada.—Supervised 30 power projects, 5 coal-prospecting permits, 8 sodium permits, and 13 leases and 33 prospecting permits for oil and gas on public land and 11 marl leases on Indian land. Surveyed 42 linear miles of river basin and 2 dam sites.

New Mexico.—Continued an areal, stratigraphic, and subsurface structural investigation in Lea and Eddy Counties for mineral classification. Supervised 11 power projects, 21 leases and 20 prospecting permits for coal, 48 permits for sodium, 15 potash leases, 19 sulfur permits, and 1,320 leases and 336 prospecting permits for oil and gas on public land and 6 agency coal mines, 2 coal leases, 49 individual Indian coal mines, and 9 leases for oil and gas on Indian land.

Examined 1 potash leasehold by geophysical methods. Surveyed 31 linear miles of river basin.

New York.—Supervised two leases for oil and gas on Indian land.

North Dakota.—Supervised 51 leases, 1 prospecting permit, and 20 licenses for coal, 4 prospecting permits for sodium, and 8 leases and 18 prospecting permits for oil and gas on public land and 1 coal permit on Indian land.

Oklahoma.—Completed an investigation of subsurface structural conditions in southern Seminole and northern Pontotoc Counties. Supervised 71 leases and 7 prospecting permits for oil and gas on public land, 14 leases and 22 mining permit leases for coal, 1 leased purchased tract and 1 unleased purchased tract for coal, 1 asphalt lease, and 1 right-of-way lease on segregated tribal and restricted allotted Indian lands, 42 zinc-lead leases on Quapaw Indian land, and 4,375 leases for oil and gas on Indian land.

Oregon.—Examined 5 dam sites for geologic conditions. Supervised 37 power projects, 2 coal-prospecting permits, and 11 leases and 11 prospecting permits for oil and gas on public land. Investigated 3 water-power sites.

South Dakota.—Supervised 4 leases, 2 prospecting permits, and 2 licenses for coal, and 32 leases and 6 prospecting permits for oil and gas on public land.

Utah.—Investigated areal geologic conditions as to coal possibilities in the Horse Canyon district, Carbon and Emery Counties. Supervised 14 power projects, 62 leases, 30 prospecting permits, and 1 license for coal, 1 sodium permit, 1 phosphate lease, and 135 leases and 364 prospecting permits for oil and gas on public land, and 6 gilsonite leases on Indian land.

Washington.—Examined 1 dam site for geologic conditions. Supervised 23 power projects, 1 lease and 6 prospecting permits for coal, and 1 lease and 1 prospecting permit for oil and gas on public land, and 5 silver-lead-gold leases, 6 tungsten leases, and 33 leases for oil and gas on Indian land. Surveyed 3 dam sites and 42 linear miles of river basin.

Wisconsin.—Supervised two power projects.

Wyoming.—Continued an areal, structural, and stratigraphic investigation in the eastern parts of Niobrara and Weston Counties; completed a structural and stratigraphic investigation in the North Baxter Basin gas area, Sweetwater County; investigated coal and phosphate resources of an area near Munger, Teton County, and the coal possibilities in the Laramie Basin area, Albany County; completed geologic structural investigations of the Red Springs anticline and Hamilton Dome areas, Hot Springs County; continued geologic investigations for mineral classification purposes of the Osage oil field area, Weston County, and of the Garland oil and gas field area, Big Horn County; and completed a geologic structural investigation of the East Lance Creek oil and gas field area for mineral-classification purposes. Supervised 11 power projects, 64 leases, 38 prospecting permits, and 23 licenses for coal, 1 sodium lease, and 1,261 leases and 516 prospecting permits for oil and gas on public land, and 2 coal leases and 43 leases for oil and gas on Indian land. Tested shut-in pressures on Naval Petroleum Reserve No. 3 for the purpose of conserving shut-in production. Performed technical supervision at Emergency Conservation Camp 858, established for conserving coal deposits. Surveyed 3 linear miles of river basin.

WORK ON PUBLICATIONS

Texts.—The book publications of the year numbered 49 in the regular series and 21 pamphlets and circulars for administrative use. The total number of pages was 9,658. Besides these printed

publications 40 brief papers were issued in mimeographed form as memoranda for the press or as informative circulars. Indexes were prepared for 16 publications, covering 2,223 pages.

Illustrations.—The illustrations prepared consisted of 771 drawings and photographs. Five hundred and ninety-two illustrations to accompany 59 reports were transmitted to the printer, and 444 proofs and 25 edition prints were examined.

Geologic map editing and drafting.—The geologic map of the Front Range, Colo., was printed. Progress was made on the Montevallo-Columbiana, Ala., folio. Geologic maps, sections, and illustrations for 17 reports were examined and edited; proofs of 15 geologic maps and sections were read; and 139 geologic maps, sections, and illustrations for 37 reports were edited, drawn, and prepared for engraving. The printing of some of these maps for State geological surveys was supervised, and proofs were read. Thirty-six photographs were lettered and retouched to show the geologic structure, and 45 lantern slides were hand-colored. Geologic maps and illustrations for 5 reports were in progress at the end of the year.

Distribution.—A total of 667 publications, comprising 49 new books and pamphlets, 102 new or revised topographic and other maps, 41 Tennessee Valley Authority maps with contours, 322 reprinted topographic and other maps, 84 new advance sheets, and 69 reprinted advance sheets were received during the year. A number of special pamphlets and forms for administrative use were also received and distributed. The total units of all publications received numbered 102,906 books and pamphlets and 1,233,131 topographic and other maps, a grand total of 1,336,037. The division distributed 67,735 books and pamphlets, 1,835 geologic folios, and 808,764 maps, a grand total of 878,334, of which 1,695 folios and 704,345 maps were sold.

The net proceeds (gross collections less copying fees and amounts refunded) from the sales of publications were \$38,653.47, which included \$38,055.67 for topographic and geologic maps and \$597.80 for geologic folios. In addition to this amount, \$12,849.03 was repaid to the Survey by other establishments of the Federal Government at whose request maps or folios were furnished. The total net receipts, therefore, were \$51,502.50.

Engraving and printing.—During the year 68 newly engraved topographic maps, including 8 revised maps, were printed, and also 34 special maps. Corrections were engraved on the plates of 242 maps. Reprint editions of 300 engraved topographic maps and 22 photolithographed State and other maps were printed and delivered. In

addition, 49 new topographic maps had been engraved and were in press June 30. Of new and reprinted maps, 424 different editions, amounting to 1,109,301 copies, were delivered.

A large amount of work was done for 67 other units of the Federal Government and State governments.

Of topographic maps and contract and miscellaneous work of all kinds, a grand total of 2,087,585 copies was printed and delivered.

The photographic laboratory made 8,792 negatives (including 3,285 wet plates for photolithographs, 901 wet plates for photographic prints, 35 paper negatives, 98 dry plates and films, 554 lantern slides, 169 diapositives, 89 halftone negatives, and 3,661 field negatives), 28,188 prints (including 1,461 blue contact prints, 1,345 blue line on metal-mounted drawing paper and other types of prints, 14,354 maps and diagrams, 10,608 glossy prints, 379 bromide enlargements, and 41 celluloid positives), 2,426 photolithographic press plates, 115 intaglio etchings, and 9 celluloid transfer prints, and mounted 2,300 prints.

LIBRARY

The total number of books and separate items circulated by the library amounted to more than 40,000. Almost 19,000 new books, periodicals, maps, and other items were received, and nearly 10,000 new cards were filed in the catalog.

The compilation of the consolidated volume of the bibliography of North American geology for 1929-39 is well under way.

APPROPRIATIONS AND EXPENDITURES

The appropriation made directly for the work of the Geological Survey for the fiscal year 1940 included 11 items, amounting to \$3,468,000, of which \$81,417.18 remained unobligated on June 30, 1940. In addition, \$10,100 was allotted from the appropriation for contingent expenses of the Department of the Interior for miscellaneous supplies.

Financial Statement of the Geological Survey for the Fiscal Year 1940

GEOLOGICAL SURVEY

75

	Funds available			Obligations			Balance
	Amounts appropriated or transferred	Repayments and adjustments		Total	Disbursements	Outstanding liabilities	
		Made	To be made				
Salaries.....	\$150,000.00	\$115.80	\$87,635.31	\$150,115.80	\$150,093.84	\$74,638.64	\$21.96
Topographic surveys.....	725,000.00	476,087.06	31,534.25	1,238,722.37	1,140,879.34	21,535.77	23,204.39
Geologic surveys.....	500,000.00	31,534.25	10,678.91	542,213.16	513,957.30	535,483.07	6,730.09
Strategic and critical minerals.....	150,000.00	1,201.77	91.66	151,293.43	124,726.55	141,766.18	9,527.25
Alaskan mineral resources.....	60,000.00	3,840.30	1,671.07	65,511.37	51,515.23	65,508.06	3.31
Gaging streams.....	1,143,000.00	752,304.76	185,616.62	2,080,921.38	2,082,952.88	23,250.14	24,718.36
Classification of lands.....	105,000.00	1,383.14	81.57	106,464.71	104,642.91	1,426.90	394.90
Printing and binding.....	125,000.00	2.85	-----	125,002.85	15,069.90	96,169.87	11,269.87
Preparation of illustrations.....	25,000.00	119.28	-----	25,119.28	24,946.33	82.87	25,029.20
Geologic and topographic maps.....	170,000.00	119,604.91	34,095.52	323,705.43	296,683.14	25,099.61	1,922.68
Mineral leasing.....	315,000.00	12,063.25	91.95	327,155.20	318,934.34	7,149.68	1,071.18
Total.....	13,468,000.00	1,398,262.37	269,962.61	5,136,224.98	4,774,431.76	280,376.04	81,417.18
Barracks and quarters, Army (transfer to Interior, Geological Survey), 1940.....	8,400.00	-----	-----	8,400.00	5,686.45	383.04	2,330.51
Federal Power Commission (transfer to Interior, Geological Survey), 1940.....	350.00	-----	-----	350.00	350.00	-----	-----
Flood control, general (transfer from Agriculture to Interior, Geological Survey).....	2 95,343.32	-----	-----	95,313.32	66,008.99	92.68	29,241.65
Flood control, general (transfer to Interior, Geological Survey).....	3 518,221.50	361.33	1,366.66	519,949.49	396,354.77	495.77	123,098.95
Flood control, Mississippi River and tributaries (transfer to Interior, Geological Survey).....	4,000.00	26,000.57	-----	30,000.57	29,960.47	-----	40.10
Improvement and maintenance, irrigation systems, Crow Reservation, Mont. (receipt limitation) (transfer to Geological Survey), 1940.....	1,300.00	-----	-----	1,300.00	1,291.20	-----	8.80
Irrigation, Indian reservations (reimbursable) (transfer to Geological Survey), 1940.....	18,250.00	-----	-----	18,250.00	18,181.35	44.46	24.19
Maintenance and improvement of existing river and harbor works (transfer to Interior, Geological Survey).....	4 311,045.88	1,315.58	312.79	312,674.25	252,157.75	592.20	59,924.30
Maintenance, Wapato irrigation and drainage system, etc., Yakima Reservation, Wash. (receipt limitation) (transfer to Geological Survey), 1940.....	500.00	-----	-----	500.00	500.00	-----	-----

¹ In addition to these appropriations there was an allotment of \$10,100.00 for miscellaneous supplies from the appropriation for contingent expenses of the Interior Department.

² Includes \$20,343.32 unobligated on June 30, 1939, and continued available for expenditure during the fiscal year 1940.

³ Includes \$12,639.25 unobligated on June 30, 1939, and continued available for expenditure during the fiscal year 1940.

⁴ Includes \$39,727.88 unobligated on June 30, 1939, and continued available for expenditure during the fiscal year 1940.

Financial Statement of the Geological Survey for the Fiscal Year 1940—Continued

	Funds available			Obligations			Balance	
	Amounts appropriated or transferred	Repayments and adjustments		Total	Disbursements	Outstanding liabilities		Total
		Made	To be made					
Operation and conservation of naval petroleum reserves (transfer to Interior, Geological Survey), 1940	40,000.00			40,000.00	39,930.85		39,930.85	69.15
Public Works Administration, act of 1938 (allotment to Interior, Geological Survey), 1938-41	\$ 698,954.82	1,959.67		700,914.49	667,300.71	1,231.05	668,531.76	32,382.73
Public Works Administration, (allotment to Interior, Geological Survey), 1935-41	\$ 58,689.83	273.63		58,963.46	33,358.10	839.96	34,198.06	24,705.40
Reclamation fund, special fund (transfer to Geological Survey)	20,000.00	8.33		20,008.33	18,391.64	.30	18,391.94	1,616.39
Special and technical investigations, International Joint Commission, United States and Great Britain (transfer to Interior), 1940	45,500.00	20.29		45,520.29	44,526.96	506.31	45,033.27	487.02
Supervising mining operations on leased Indian lands (reimbursable) (transfer to Geological Survey), 1940	100,000.00	6.80	78.33	100,085.13	99,214.88	158.67	99,373.55	711.58
Tennessee Valley Authority fund (transfer to Interior, Geological Survey), 1940	102,000.00	10,021.97	2,536.02	114,557.99	109,486.27	4,382.91	113,869.18	688.81
Working fund, Interior, Geological Survey (Agriculture, highway fund, act of June 16, 1933, National Industrial Recovery)	20,000.00	2,114.96	254.16	22,369.12	21,834.43	534.69	22,369.12	
Working fund, Interior, Geological Survey (cooperative construction of rural post roads)	\$ 13,820.80	906.65	1,011.34	15,738.79	6,576.80		6,576.80	9,161.99
Working fund, Department of the Interior (transfer from Army engineers to Geological Survey for topographic mapping)	\$ 1,059.67			1,059.67	1,059.67		1,059.67	
	\$ 4,278.90			4,278.90	2,379.06	1,657.12	4,036.18	242.72
Transfer total	2,061,714.72	42,989.78	5,559.30	2,110,263.80	1,814,550.35	10,919.16	1,825,469.51	284,794.29
Grand total	5,529,714.72	1,441,252.15	275,521.91	7,246,488.78	6,588,982.11	291,295.20	6,880,277.31	366,211.47

\$ Balance unobligated on June 30, 1939, and continued available for expenditure during the fiscal year 1940.

¢ Includes \$23,689.83 unobligated on June 30, 1939, and continued available for expenditure during the fiscal year 1940.

**Classification of Obligations Incurred by U. S. Geological Survey During the Fiscal Year
Ending June 30, 1940**

	Salaries	Topographic surveys	Geologic surveys	Strategic and critical minerals	Alaskan mineral resources	Gaging streams
Salaries of permanent employees.....	\$150,093.84	\$861,965.91	\$420,484.03	\$59,746.96	\$36,459.04	\$1,292,547.88
Wages of temporary employees.....		449,401.67	25,572.53	15,820.48	11,467.98	387,781.68
Supplies and materials.....		11,944.89	7,703.66	4,283.45	3,297.92	42,025.75
Other storage and pasturage of animals.....		382.75	62.75	132.03		940.00
Communication services.....		1,150.90	302.91	150.41	30.99	8,085.46
Travel expenses.....		157,393.31	31,930.49	19,016.08	9,887.62	176,177.44
Transportation of things.....		4,237.60	2,232.76	3,166.27	1,155.49	17,248.99
Hire, maintenance, repair, and operation of freight-carrying vehicles.....		61,343.27	5,661.44	2,905.91	4.88	73,089.56
Printing and binding.....		70,708.10	11,254.32	3,654.56	5,892.68	5,892.45
Furnishing of heat, light, power, water, and electricity.....		2.10	8.75			887.54
Rents.....		18.20				4,773.14
Repairs and alterations.....		11,983.12	5,658.22	144.47	269.58	57,412.78
Special and miscellaneous current expenses.....		30.00	60.40	7.34	52.67	83.64
Purchase of passenger-carrying vehicles.....		1,776.81	1,619.79	4,868.59		26,324.33
Purchase of freight-carrying vehicles.....		3,506.11	5,538.45	3,082.53		35,548.10
Purchase of scientific instruments and parts.....		11,120.08	8,733.78	7,987.23	897.72	135,777.05
Other equipment.....		18,444.69	10,520.11	5,388.87	1,419.98	40,692.63
Structures and parts.....						153,192.67
Miscellaneous refunds, adjustments, and transfers.....		297,943.43	5,782.88	11,411.00	741.00	507,309.18
Total.....	150,093.84	1,963,352.94	543,127.27	141,766.18	71,577.55	2,966,790.27

	Classifi- cation of lands	Printing and binding	Prepara- tion of illustra- tions	Geologic and topo- graphic maps	Mineral leasing	Total
Salaries of permanent employees.....	\$93,475.43		\$24,554.70	\$248,411.52	\$401,620.78	\$3,589,360.09
Wages of temporary employees.....	1,340.06				9,598.79	900,983.19
Supplies and materials.....	561.57		237.64	26,758.14	4,807.22	101,620.24
Other storage and pasturage of animals.....						1,517.53
Communication services.....	233.59			1.10	3,154.20	13,109.56
Travel expenses.....	6,140.52		3.90	255.57	31,437.06	432,241.99
Transportation of things.....	114.42			370.50	1,350.01	29,876.04
Hire, maintenance, repair, and operation of freight-carrying vehicles.....	492.08				959.92	144,457.06
Printing and binding.....	1,042.50	\$111,269.87	205.61	11,359.74	428.52	222,708.35
Furnishing of heat, light, power, water, and electricity.....					2,940.40	3,838.79
Rents.....					720.00	5,511.34
Repairs and alterations.....	134.93		27.35	11,376.59	2,597.91	89,604.95
Special and miscellaneous current expenses.....					97.98	332.03
Purchase of passenger-carrying vehicles.....	2,183.26				7,022.76	43,795.54
Purchase of freight-carrying vehicles.....						47,675.19
Purchase of scientific instruments and parts.....	2.00			1,993.60	34.59	166,546.05
Other equipment.....	201.44			21,192.66	6,618.44	104,478.82
Structures and parts.....						153,192.67
Miscellaneous refunds, adjustments, and transfers.....	148.01			63.33	6,029.05	829,427.88
Total.....	106,069.81	111,269.87	25,029.20	321,782.75	479,417.63	6,880,277.31

In addition to the above amounts, there was expended directly by cooperating agencies \$52,296.90 for topographic surveys, \$663.00 for geologic surveys, and \$540,791.65 for stream gaging.

APPENDIX

Summary of Outstanding Mineral Withdrawals and Classifications

[June 30, 1940, in acres]

State	Coal		Oil		Oil shale		Phosphate		Potash
	With- drawn	Classified as coal land	With- drawn	Classi- fied as oil land	With- drawn	Classi- fied as oil-shale land	With- drawn	Classi- fied as phos- phate land	With- drawn
Alaska.....		56,993							
Arizona.....	139,415								
Arkansas.....		61,160							
California.....	17,603	8,720	1,178,392						90,324
Colorado.....	4,142,233	3,082,272	215,370		1,172,778	952,239			
Florida.....									
Idaho.....	11,520	4,603					66,796	120	
Louisiana.....			466,990	4,233			276,239	270,036	
Montana.....	6,044,408	19,373,884	1,336,697	67,651			280,089	3,833	
Nevada.....	83,673								39,422
New Mexico.....	3,298,834	1,074,723							9,282,160
North Dakota.....	5,954,364	11,178,286	84,894						
Oregon.....	4,361	18,887							
South Dakota.....		250,093							
Utah.....	3,152,792	1,395,862	1,035,034		2,737,274	2,703,755	277,344	2,937	
Washington.....	691,801	141,444							
Wyoming.....	2,143,991	26,847,235	541,777		2,079,897	425,214	989,133	25,293	
Total.....	25,684,995	33,494,162	4,859,154	71,884	5,989,949	4,081,208	1,889,601	302,219	9,411,906

¹ Includes 3,151 acres of coal land reserved for use of the United States (coal reserve No. 1).² Includes 2,078 acres of coal land reserved for use of the United States (coal reserve No. 2).³ Includes 13,578 acres withdrawn as helium reserve.

Definitions of Known Geologic Structure, Fiscal Year 1940

State	Field	Date promul- gated	Field area (acres)
California.....	Agey.....	Dec. 4, 1939	120
Do.....	Coalinga-Guajarral Hills.....	do.....	4,244
Do.....	Coalinga West Side ¹	do.....	16,162
Do.....	Eastmont.....	July 19, 1939	760
Do.....	Keating.....	Dec. 4, 1939	160
Do.....	Kern Front ¹	do.....	5,760
Do.....	Kern River ¹	do.....	10,612
Do.....	Lost Hills ¹	do.....	4,766
Do.....	McKittrick Front ¹	Feb. 15, 1940	6,298
Do.....	McVan.....	Dec. 4, 1939	440
Do.....	Mount Poso ¹	do.....	3,080
Do.....	Northeast Coalinga.....	Dec. 15, 1939	2,614
Do.....	North Mount Poso.....	Dec. 4, 1939	1,441
Do.....	Ring.....	do.....	480
Do.....	Round Mountain ¹	July 19, 1939	4,311
Do.....	Temblor.....	Feb. 15, 1940	590
Do.....	West Kern Front ¹	Dec. 4, 1939	1,920
Colorado.....	Bell Rock.....	May 18, 1940	2,463
Do.....	Piceance Creek ¹	Oct. 5, 1939	14,470
Do.....	South McCallum.....	July 14, 1939	4,524
New Mexico.....	Bloomfield ¹	Apr. 13, 1940	1,760
Do.....	Hospah.....	Jan. 5, 1940	719
Utah.....	Clay Basin ¹	Apr. 11, 1940	6,688
Wyoming.....	East Lance Creek ¹	Jan. 3, 1940	3,120

¹ Revised.

Mineral Production From Public Land and Revenues Therefrom, Fiscal Year 1940

State	Petroleum (barrels)	Natural gas (M cubic feet)	Gasoline (gallons)	Coal (short tons)	Potas- sium salts (short tons)	Sodium salts (short tons)	Phos- phate rock (long tons)	Accrued revenues
Alabama.....				55,829				\$5,582.90
Alaska.....				149,476				7,456.15
Arizona.....				270				2,622.87
California.....	14,680,189	32,569,574	2,803,229			96,200		2,574,691.51
Colorado.....	944,352	1,391,425	49,493	515,541		304		124,287.06
Idaho.....				1,646				573.45
Louisiana.....	298,693	1,379,274	507,515					84,148.89
Michigan.....								17.50
Montana.....	458,311	2,665,270	11,150	303,746			9,425	99,058.92
Nebraska.....								30.00
Nevada.....				9				327.99
New Mexico.....	9,382,138	23,231,181	9,804,034	71,306	663,855	10,334		1,029,258.89
North Dakota.....		35,707		658,742				38,991.10
Oklahoma.....	117,163		133,134					11,371.96
Oregon.....								200.50
South Dakota.....				1,613				750.79
Utah.....	7,468	3,191,394	217,504	1,078,535				156,281.77
Washington.....				27,040				2,704.01
Wyoming.....	13,954,927	12,916,346	25,948,871	1,079,815				1,938,373.87
Total.....	39,843,241	77,380,171	39,474,930	3,943,568	663,855	106,838	9,425	6,076,730.13
Total, 1939.....	37,911,269	84,995,861	37,228,062	4,104,326	477,920	77,653	26,017	5,968,571.72

General Summary of Cases Involving Land Classification

Class of cases	Record for fiscal year 1939-40						Record since receipt of first case	
	Pending prior to July 1, 1939	Received during fiscal year	Total	Acted on during fiscal year	Pending June 30, 1940	Gain or loss during fiscal year	Received	Acted on
Mineral leasing laws:								
Permit applications.....	21	320	341	323	18	+3	63,020	63,002
Lease applications.....	27	2,230	2,257	1,866	391	-364	12,776	12,385
Committee cases.....							13,322	13,322
Concurrence.....	52	2,866	2,918	2,799	119	-67		
Interference (surface rights).....	5	173	178	173	5			
Unit operation plans.....	27	15	42	36	6	+21	1,680	1,674
Cases involved in unit plans.....	132	231	363	338	25	+107	5,872	5,847
Development (drilling operations, etc.).....	5	84	89	86	3	+2	17,764	17,761
Miscellaneous.....							7,952	7,952
Mineral classification:								
Oil and gas (including "349").....	37	1,399	1,436	1,312	124	-87	33,554	33,430
Miscellaneous.....								
Water and power:								
Federal Power Commission:								
Preliminary permits.....	2	87	89	81	8	-6	657	649
Licenses.....							28	28
Determinations under sec. 24.....	15	39	54	47	7	+8	791	784
Classification.....	3	4	7	7		+3	569	569
Rights-of-way.....	12	117	129	103	26	-14	7,652	7,626
Irrigation project reports.....	1	4	5	1	4	-3	949	945
Miscellaneous.....								
General information:								
General Land Office (co-ops., etc.).....	7	614	621	542	79	-72		
Indian Office.....							9,549	9,549
Miscellaneous.....								
Total.....	346	8,183	8,529	7,714	815	-469		

Topographic Mapping by the Geological Survey in the United States, Puerto Rico, and Hawaii, to June 30, 1940

State	Total area mapped during fiscal year 1940 (square miles)							Types of standard surveys with contours, fiscal year 1940 (square miles)			Total area mapped to June 30, 1940 (square miles)	Per-centage of total area of State mapped to June 30, 1940	Control, fiscal year 1940			
	Planimetric on scale of 1 to 1— For publication on standard scales, with contour intervals from 5 to 100 feet, mapped on field scale of 1 to—							New survey	Resurvey	Revision			Spirit levels (miles)	Transit traverse stations (miles)	Triangulation stations established	
48,000	24,000	10,000	12,000	15,840	20,000	24,000	48,000	96,000								
Alabama							342			329	13		22,649	43.6	69	131
Arizona								834		834			30,970	27.2	134	
Arkansas							176	305			419		24,293	45.5		66
California							39	493		50	502		129,193	81.6	272	17
Colorado			15				313	287		138	477		57,662	55.5	206	60
Connecticut							54				54		4,965	100.0		
Delaware							6				6		2,370	100.0		
District of Columbia													70	100.0		
Florida							340			340			6,935	11.8	101	
Georgia					2 114		19	237			370		25,202	42.5	20	54
Idaho							39	128		81	72	14	37,208	44.4	80	
Illinois							799			633	149	17	42,151	74.4	618	204
Indiana							489			489			5,876	16.2	503	416
Iowa							275			275			14,135	25.2		
Kansas							252	524		530	246		65,442	79.7	2,383	462
Kentucky							113			113			27,559	67.9	97	
Louisiana		1,224					518			238	200		11,588	23.9		
Maine							463			463			22,468	68.0	96	13
Maryland							210				210		12,327	100.0	131	55
Massachusetts													8,266	100.0	50	
Michigan		300					469			305			15,699	27.1		
Minnesota							302			386			9,542	11.3		
Mississippi							1,239			239			7,820	16.7		
Missouri										1,548	622		56,373	81.2	317	
Montana				3			415	752		518			37,824	25.7	188	19
Nebraska							174	107			197		28,225	36.4	53	33
Nevada							352			96	256		43,536	39.3	235	
New Hampshire													9,302	100.0		15
New Jersey							92				92		8,224	100.0	44	
New Mexico								671		505			33,636	27.4	115	24
New York							96	297			393		49,204	100.0	230	
North Carolina							343			307			19,529	37.3		
North Dakota				2 1,053			27	468			1,116		15,871	22.4	58	239
Ohio										468			41,040	100.0		
Oklahoma							48	402			293		41,342	59.0	201	240
Oregon							496			496			34,132	35.3	174	30
Pennsylvania										392			41,276	91.5	48	6
Rhode Island							58	1,026			104	588	1,248	100.0		
							120				120					

BUREAU OF RECLAMATION

John C. Page, *Commissioner*

ESSENTIAL to a long-time National Defense program is the conservation and utilization of land and water resources in the western one-third of the United States. Through the work of the Bureau of Reclamation, water is being made available for the irrigation of new lands to provide homes for destitute migrants and to insure adequate food supplies for the growing population of the West. Supplemental water is being provided for established agricultural and urban areas threatened with desolation. Low-cost power is being produced for both coastal and inland industrial development and for the recovery of strategic minerals. The growing market in the West for American manufactured goods and agricultural products of other areas is of increasing importance in view of the possible loss of foreign trade. Natural resources must be developed, industries must be maintained and enlarged, populations must be stabilized, and dependable supplies of food materials must be produced to place the United States in a position of preparedness, increasingly strengthened, for defense against dangers threatening the Nation either from within or from without.

During the fiscal year Federal irrigation projects were prepared to serve more than 106,000 additional acres of new land.

More than 23,000 acres of land were opened for settlement on the Sun River project in Montana and the Riverton project in Wyoming, providing new homes for approximately 260 farm families, dislocated by drought or other unfortunate circumstances. Since the Bureau was established in 1902, it has placed works in operation to serve nearly 4,000,000 acres of land which support approximately a million people. Of this total acreage approximately 2,500,000 acres were once unproductive desert, and 1,500,000 acres were in non-Federal irrigation districts which had inadequate water supplies. Under the present construction program, the largest in the Bureau's history, water will be provided for about 2,500,000 additional acres, transforming them from sagebrush wastes into productive farms that will support another million people. This will bring to 5,000,000 acres the total of new lands the Bureau has watered. Supplemental water will be supplied for about 3,500,000 acres already irrigated.



WATER FOR THE WEST.

Upper: Grand Coulee Dam on the Columbia River in Washington State, largest concrete structure in the world, nears completion under the Bureau of Reclamation program to provide electric power for national defense and farm homes for settlers in the semiarid West.

Lower: Field of wheat ready for harvest on a Wyoming Reclamation Project Farm.

bringing to almost 5,000,000 acres the lands which will have been rescued by the Federal Government supplying supplemental water. The Bureau of Reclamation estimates that as many as 20,000,000 additional acres can be irrigated with water resources as yet undeveloped and under policies now in effect. The future growth and stabilization of conditions in the West will be correlated in large measure with the conservation of these remaining water resources and their beneficial use.

Crops produced on lands served by Reclamation projects are valued at more than \$100,000,000 a year, and a market for American industry worth \$200,000,000 a year has been established. Taxable property protected by and carved out of lonely desert land by Reclamation projects totals more than \$4,500,000,000.

Power, an important byproduct of Reclamation, is essential to a well-balanced program for national defense. Defense industries in the West are depending on cheap hydroelectric power for the manufacture of such an important product as aluminum and such vital equipment as airplanes and warships. There is increasing demand for Boulder Dam power for the development of defense industries. In the event of a prolonged emergency with continued disruption of ocean transport, the United States must look to the West as its principal source of supply for most of the strategic minerals which are now largely imported for national defense and general industrial use, principally from countries now at war. Known deposits of varying extent and grade of the principal strategic minerals, the development of which might require large blocks of power for processing, are located within transmission range or economical transportation distance of Grand Coulee Dam, Shasta Dam, and Boulder Dam.

STABILIZATION OF THE GREAT PLAINS

Prolonged drought during the last decade has forced, according to reliable estimates, more than 75,000 farm families to leave the Great Plains area alone. Most of these have moved westward seeking irrigated land where they would have an assured water supply, but the irrigated land available has been inadequate to settle more than probably 5 percent of those who desire to reestablish themselves. The remainder have largely become migratory farm laborers, eking out a bare existence, or have become dependent upon relief.

Five reclamation projects, which will provide water for 52,000 acres in the Great Plains area, were approved by the President during the fiscal year and funds allocated for their construction under the Great Plains water-conservation and utilization program. This program was recommended by the Northern Great Plains Committee of the

National Resources Planning Board to aid in the rehabilitation and stabilization of the area, and thus check further migration, and make possible the return of a substantial percentage of former Great Plains farmers. The Congress included in the Interior Department Appropriation Act of 1940 an item of \$5,000,000 to assist in financing the necessary construction. This money was appropriated subject to allocation by the President to carry out the program with the assistance of moneys to be contributed by the W. P. A. from work-relief funds for expenditure largely on "relief labor." The five projects are: Buford-Trenton project in North Dakota, Second Division of the Buffalo Rapids project in Montana, Rapid Valley project in South Dakota, Mirage Flats project in Nebraska, and the Bismarck project in North Dakota. The National Resources Planning Board will help plan and coordinate the projects and the Department of Agriculture will arrange for the settlement, repayment, and operation, while the Bureau of Reclamation will build all the irrigation structures. Surveys and preliminary work were under way during the year.

The Buford-Trenton project, approved by the President in September 1939, will serve 13,400 acres in Williams County in western North Dakota on the north side of the Missouri River. Water will be obtained from the Missouri River. Principal features to be constructed are a pumping plant, 15 miles of main canal, 6 miles of laterals, and sublaterals, drains, and ditches. Electrical energy required for pumping will be obtained from a plant to be installed at Fort Peck Dam. Forage and small grains to be used in support of the livestock industry will be the main crops. The project is estimated to cost \$1,500,000, of which amount \$630,000 will be made available from the special 1940 appropriation of \$5,000,000 and the remainder, \$870,000 will be expended by the Work Projects Administration. Active construction of the project began May 6, 1940. Project headquarters of the Bureau of Reclamation are at Williston, N. Dak.

The second unit of the Buffalo Rapids project, authorized by the President in November 1939, will provide water for the irrigation of 9,800 acres on the south side of the Yellowstone River in Custer, Prairie, and Dawson counties near the towns of Shirley, Terry, and Fallon, Mont. Water will be pumped from the Yellowstone River. Land development, including the construction of farm laterals and rough land leveling will be undertaken as a part of the construction. Forage and small grains for the support of the livestock industry will be the principal crops. The estimated cost of constructing this division is \$1,450,000, of which amount \$550,000 will be obtained from the \$5,000,000 special appropriation and the remaining \$900,000 is to be provided by the Work Projects Administration. No construc-

tion work had been started at the end of the fiscal year. Headquarters of the Bureau of Reclamation are at Glendive, Mont.

The Rapid Valley project received Presidential approval in November 1939. Located on the edge of the Black Hills in the western part of South Dakota, the project will serve 12,000 acres and will cost \$2,470,000, of which amount \$980,000 is to be provided from the special 1940 appropriation and \$1,490,000 by the Work Projects Administration. Storage of water for irrigation and domestic use will be provided by the construction of an earth and rock-fill dam at the Pactola site on Rapid creek, 15 miles upstream from Rapid City. Headquarters of the Bureau of Reclamation are at Rapid City, S. Dak.

The Mirage Flats project, approved in May 1940, will serve 12,000 acres on the north bank of the Niobrara River about 11 miles south of Hay Springs, Nebr. The plan is to construct a diversion dam on the Niobrara River, about 15 miles of main canal, and a system of laterals and farm ditches. An earth and rock-fill dam will be built about 9 miles above the diversion dam to store 30,000 acre-feet of water. The project is estimated to cost \$2,560,000, of which amount \$985,000 will be repaid by the water users and the remainder will be made up of expenditures by the Work Projects Administration. Preliminary surveys have been made but no construction work has been started. Headquarters of the Bureau of Reclamation are at Hemingford, Nebr.

The Bismarck project, approved for construction in May 1940, will include 4,800 acres on the east side of the Missouri River directly south of Bismarck, N. Dak. Water for irrigation will be pumped from the Missouri River 20 feet and conveyed by 10 miles of main canal into the lateral and farm ditch system. Power for pumping will be obtained from the North Dakota Power & Light Co. The project is estimated to cost \$590,000 of which amount \$250,000 will be reimbursable from the special 1940 appropriation and the remainder will be expended by the Work Projects Administration.

Additional Projects Authorized for Construction

Two additional projects were authorized by the President for construction by the Bureau of Reclamation during the year, which when completed will provide a supplemental water supply to irrigate 1,200,000 acres of developed land.

A report, published as House Document No. 693, Seventy-sixth Congress, third session, authorizing the construction of the San Luis project on the Rio Grande in Colorado, was submitted to the Congress on April 10, 1940. This project will serve 400,000 acres of

developed land around Monte Vista in need of supplemental irrigation water. Principal construction features include Wagon Wheel Gap Dam and Reservoir, two reservoirs in the Conejos River southwest of Alamosa and a small transmountain diversion from the Colorado River Basin to the Rio Grande Basin. The project is estimated to cost \$17,465,000 and \$152,000 had been appropriated at the end of the fiscal year to begin work preliminary to construction.

A report authorizing the construction of the Kings River project in California was submitted to the Congress on February 10, 1940, and published as House Document No. 631, Seventy-sixth Congress, third session. The report contemplates a water storage project for supplemental irrigation water on about 800,000 acres of developed land, and for flood control and power development. The main construction features include the Pine Flat Dam, Reservoir, and power plant. The project is estimated to cost \$22,300,000. No funds had been appropriated for construction.

Columbia Basin Joint Investigations

Looking forward to the time in 1943 or 1944, when water may be available for the irrigation of the first block of lands included in the 1,200,000 acres ultimately to be irrigated by Grand Coulee Dam in Washington, the Bureau of Reclamation in July 1939 launched joint investigations of the Columbia Basin irrigation project. The object of the investigations is to plan for the successful settlement and development of the Columbia Basin project area, which it is expected will support an increase of 350,000 in population of the State. In November a plan for the joint investigations was set up for study which included 28 separate problems in addition to the basic engineering surveys. Participating in the studies in some capacity and in varying degrees are more than 40 agencies of the Federal, State, and local governments, educational institutions, private industry, and local civic organizations. Subjects of study range from the number and proper location of new towns or cities within the area to suitable guides for ornamental and useful tree plantings on the individual farmsteads. Considerable progress in these studies was made during the year.

Policies Regarding Opening of Lands for Settlement

Near the end of the fiscal year the Congress further clarified the historic policy of the Bureau of Reclamation with respect to offering home-making opportunities to needy farm families. It was declared that in the opening to entry of newly irrigated public lands "preference shall be given to families who have no other means of earning a livelihood, or who have been compelled to abandon, through no fault of their

own, other farms in the United States, and with respect to whom it appears after careful study, in the case of each such family, that there is probability that such family will be able to earn a livelihood on such irrigated lands." This policy emphasizes the continued need for and the progress in resettling and rehabilitating deserving American citizens. The Great Plains "relief" projects express this policy.

As irrigation works are completed and water becomes available to irrigate lands on Federal Reclamation projects, announcement of the opening of any public land is made by the Secretary of the Interior. To insure successful settlement, regulations of the Department require, among other things, that an applicant for a public farm unit must have a cash capital of at least \$2,000, or an equivalent in farm implements, livestock, or other useful assets. To meet this requirement, financial assistance was again offered prospective settlers by the extension of important legislation enacted last year authorizing the Farm Security Administration to make loans to settlers who otherwise qualified under Bureau regulations to enter a reclamation farm unit.

The 90-day preference right of entry for ex-service men on public land expired at the close of February 14, 1940, with the exception of lands which may be obtained in the future under the Boulder Canyon Project Act.

Transmission Lines

To correct a critical and complicated power situation in Wyoming and Nebraska, where generating plants on four separate Reclamation projects are in operation, an interconnecting line was being constructed, tying two power systems together, the Kendrick-North Platte systems, which already were joined, and the Riverton-Shoshone systems, which also were hooked together on a temporary basis. This 4-project hook-up is a 66,000-volt line 120 miles long extending from Casper to Thermopolis, Wyo. This will relieve a power shortage which exists on the North Platte and Kendrick projects, owing to an extremely dry year which has resulted in a shortage of water for power generation at the Seminole Dam. A transmission line from the Seminole power plant to Greeley, Colo., will serve, eventually, as an interconnection between the Kendrick and Colorado-Big Thompson projects.

In the Southwest also where severe and extended drought has created an extraordinary water shortage and curtailed the normal power production, the construction of transmission lines and a substation was being accelerated during the year in order to bring Boulder Dam power to central Arizona through a connection at Parker Dam with the system of the Metropolitan Water District of Southern California. In addition to the Parker-Phoenix and Parker-Blaisdell lines, the latter being necessary to supply power for the pumping of water on the Gila

project, two other lines were being considered to serve the Tucson and Coolidge areas, where serious need for Parker Dam power has developed.

Boulder Dam Power

Boulder Dam, with eight large generators and one smaller one in operation, had almost doubled its output during the fiscal year, generating 2,834,248,000 kilowatt-hours of electrical energy. The Bureau of Reclamation paid into the United States Treasury \$3,700,000. The gross income during the year, including power receipts and payments on power machinery by the lessees, totaled \$5,360,000.

Looking toward important legislation to revise certain provisions of the Boulder Canyon Project Act, hearings were held by the Congress on a bill for the adjustment of rates and charges for electrical energy generated at Boulder Dam, and for disposition of revenues derived therefrom and for other purposes.

Control and Supervision to Protect Important Structures

In connection with plans for national defense, a survey was made during the year of the control exercised and the supervision given dams, power plants, and other important structures on Reclamation projects. At Boulder Dam rigid restrictions were imposed and rangers were on duty at all times at strategic points. Generally speaking, however, there were few restrictions on visitors other than that they were barred from the work areas without special permits, and at most of the power plants they were permitted only in restricted areas and under observation of employees. Such arrangements as were thought necessary to prevent sabotage and to protect important structures were being made.

CONSTRUCTION PROGRAM

The Bureau of Reclamation continued its major construction program during the fiscal year. Work was in progress on 27 projects in 13 States.

Thirteen major storage dams and one diversion dam were under construction during the year. Of these, four storage and the one diversion dam were completed, leaving nine dams still under construction at the end of the year. Those completed were: Seminole Dam and power plant, Kendrick project, a 290-foot concrete arch dam, on the North Platte River in Wyoming; Boca Dam, Truckee River project, a 110-foot earth-fill structure on the Little Truckee River in California; Grassy Lake Dam, upper Snake River storage project, a 120-foot earth-fill dam on Grassy Creek in Wyoming; Fres-

no Dam, Milk River project, a 77-foot earth-fill dam on the Milk River in Montana; and the Roza Diversion Dam, Yakima project, a concrete gravity weir on the Yakima River in Washington.

The dams completed during the year bring to 161 the total number of dams completed by the Bureau since its origin in 1902. Of these, Shoshone, Arrowrock, Owyhee, and Boulder were each, at the time of completion, the highest in the world.

The nine dams under construction at the end of the year were: Grand Coulee Dam, Columbia Basin project, Washington, a 553-foot concrete, straight-gravity dam on the Columbia River, 83.3 percent completed; Shasta Dam, Central Valley project, California, a 560-foot concrete, straight-gravity dam on the Sacramento River, 40 percent completed; Friant Dam, also on Central Valley project, a 320-foot concrete straight-gravity dam on the San Joaquin River, 29 percent completed; Marshall Ford Dam, Colorado River project in Texas, a 270-foot concrete straight-gravity dam on the Colorado River, original contract for 190-foot low dam 97 percent completed; Green Mountain Dam, Colorado-Big Thompson project, Colorado, a 270-foot earth and rock-fill dam on the Blue River, 36 percent completed; Vallecito Dam, Pine River project, Colorado, a 150-foot earth-fill dam on the Pine River, 79 percent completed; Deer Creek Dam, Provo River project, Utah, a 240-foot earth-fill dam on the Provo River, 50 percent completed; Wickiup Dam, Deschutes project, Oregon, a 100-foot earth-fill dam on the Deschutes River, which is being constructed partly under a contract and partly by Civilian Conservation Corps forces; and Crane Prairie Dam, also on the Deschutes project a 40-foot earth-fill structure, 82 percent completed. Of these, two—Friant and Crane Prairie—were begun during the year.

Four of the storage dams under construction are of tremendous size. They are Grand Coulee, Shasta, Friant, and Marshall Ford. Grand Coulee will be the largest concrete dam in the world, while Shasta and Friant Dams will be second and fourth largest, and Marshall Ford will be fifth. Boulder Dam, although ranking first in height, is third largest.

During the fiscal year 1940 the Bureau constructed 354 miles of canals, 474.5 miles of drains, 23 tunnels with a total length of 31,430 feet, 464.4 miles of roads, 38.9 miles of railroad, 548.1 miles of transmission lines, 139.7 miles of telephone lines, 46.5 miles of pipe lines, 3,970 canal structures, 173 bridges, 824 culverts and 40 flumes. There were placed in dams 3,471,897 cubic yards of concrete, 2,951,752 cubic yards of earth, and 465,165 cubic yards of rock; and 33,348,647 cubic yards of earth and rock were excavated. A total of 4,266,131 barrels of cement were used.

Grand Coulee Dam

Grand Coulee Dam is the key control feature of the Columbia Basin project, designed to provide water for the irrigation of 1,200,000 acres of dry land in central Washington and for the generation of large blocks of cheap hydroelectric power for irrigation pumping requirements, and industrial and urban consumption. Rising to a height of 553 feet and stretching across the Columbia River 4,300 feet, the dam was nearing completion at the end of the fiscal year, with earnings under the second contract having reached 83.3 percent of the estimated contract values of \$35,476,440. Concrete in several blocks in the right abutment section were only about 6 feet below the ultimate height at elevation 1,311.08, and the lowest blocks, in the spillway section, were at elevation 1,145. With only 57.1 percent of the time elapsed, the contractor was well ahead of schedule. During the year there were placed in the dam 3,325,821 cubic yards of concrete, 22,914,993 pounds of reinforcing steel, 14,346,829 pounds of outlet conduit gates and linings, and 17,093,649 pounds of bulkhead gates, penstocks, trash racks, pipe tubing, and miscellaneous metal work.

Installation of turbines for the two initial 14,000-horsepower station service generating units was under way at the end of the year, and parts of one of the generators had been received. It was expected that these units would be ready to operate within a few months.

Excellent progress was made on the economic investigations and soil surveys of the 1,200,000 acres of irrigable land. At the end of the year retracement surveys were about 98 percent complete, topography 88 percent, classification 73 percent, and appraisal 55 percent.

The work of relocating State highways in the Columbia River reservoir area was progressing under the supervision of State highway officials. Work was started in May on construction of the Kettle Falls bridge for the Great Northern railway relocation. The work of clearing the reservoir area was continued with W. P. A. forces.

Construction of the Leavenworth station and other works in connection with the migratory fish control program were nearing completion, and will be used in caring for the 1940 runs of salmon. Construction had been started at the Entiat and Winthrop hatcheries. Transplanting of adult fish from the Columbia River to tributary streams, made necessary by the construction of Grand Coulee Dam, continued to the end of the fiscal year and will be continued, in part, until construction of works has advanced sufficiently to care for all fish under the permanent program.

Central Valley Project

During the fiscal year the construction of Shasta Dam advanced to approximately 40 percent of completion. Excavation had been nearly completed and the contractor had his plant in such a condition that the pouring of concrete could start soon after the end of the fiscal year.

The work of preparing the roadbed for the relocated railroad around Shasta Reservoir site was nearing completion. The only features on which a substantial amount of work remained to be done were the Salt Creek and O'Brien Creek Bridges, for which the erection of superstructures was about to be started, and the Pit River Bridge, for which the substructure was about one-fourth completed and the shop fabrication of the superstructure was under way.

The track on the relocated railway is being laid by the Southern Pacific Co. and most of the work in connection with the relocation of the State highway is under the direct supervision of the California division of highways.

On the Friant division construction was started on Friant Dam on the San Joaquin River, the second large dam of the Central Valley project. It is to be a straight-gravity concrete dam 320 feet high and 3,430 feet long, having a volume of 2,200,000 cubic yards. The reservoir will have a total capacity of 520,000 acre-feet. The contract was awarded on October 9, 1939, to Griffith Co. and Bent Co. on their bid of \$8,715,358, the lowest of 5 received. Construction was started on November 3, 1939. Earnings through June amounted to \$3,211,047, or 29 percent of the revised estimated cost of \$11,075,541. Work performed consisted mainly of excavation which totaled 1,588,870 cubic yards aggregate deposits and stripping pumicite deposits. The contractors' plant construction had advanced sufficiently to permit the start of concreting soon after the close of the year.

On the Delta division the three contracts for the construction of the second and third sections of the Contra Costa Canal and four canal pumping plants were completed. A transmission line to the pumping plants which was started during the year was also completed. Construction of the fourth section of the canal and the canal headworks was started and contracts covering the works were approximately 25 percent and 70 percent completed, respectively, at the end of the fiscal year.

By means of Shasta Dam in the north and Friant Dam in the south, regulation of both the Sacramento and the San Joaquin Rivers will provide adequate water to supplement the irrigation supply of a

large area of highly improved orchard and farm lands in the southern San Joaquin Valley; reestablish navigation to Red Bluff on the Sacramento River; prevent salt water intrusion in the irrigation channels of the delta of the Sacramento-San Joaquin Rivers; provide supplemental water for irrigation, domestic and industrial uses on the Walnut Creek-Martinez area, south of Suisun Bay; and make possible the generation of 375,000 kilowatts of water power at Shasta Dam.

Boulder Canyon Project

Construction at Boulder Dam during the year consisted of the erection of machinery and the installation of electrical equipment. Operating at the end of the fiscal year were eight of the large 115,000 horsepower and one smaller 55,000 horsepower units. Six of the large units, N-1 to N-6, inclusive, are in the Nevada wing and two of the large ones, A-6 and A-7, and the smaller one, A-8, are in the Arizona wing. Turbine parts for generating units A-1 and A-2 had been received and were being installed by Government forces at the end of the year. Specifications for the turbine for unit A-5 were issued in June, and generator specifications for this unit were completed and ready to be issued at the end of the month, which would leave yet to be ordered equipment for only five units, A-3, A-4, A-9, N-7, and N-8.

The 80-mile All-American Canal, by far the largest irrigation ditch in the United States, was practically completed. This canal with its 130-mile Coachella branch will carry Colorado River water to irrigate 1,000,000 acres of land in Imperial and Coachella Valleys in southern California. Drop No. 1 and Coachella turnout were completed early in the year. The contract covering the Alamo River crossing, New Briar Canal crossing and Central Main check and turnout, was completed in December. The only remaining contract, that for the clay blanketing of a section of the canal, will be completed soon after the close of the year.

Some repair work of damage caused by the earthquake in May was necessary and was performed by Government forces. An intercepting drain below the canal, to protect land of the Reservation Division of the Yuma project from seepage, was being excavated by Government forces.

Excavation of a 40-mile section of the Coachella Branch Canal was completed in March. Work under a contract for excavation and structures in the second 40-mile section was started in September and was 31 percent completed at the end of the year.

Colorado-Big Thompson Project

Construction was under way on Green Mountain Dam and the Continental Divide tunnel, two important features of the Colorado-Big Thompson project, designed to provide a supplemental water supply for 615,000 acres of land now under cultivation, situated east of the Rocky Mountains in Colorado, with water collected and stored on the western slope of the mountains in the headwaters of the Colorado River. Stored water will be transported through the Continental Divide in a 13.1-mile tunnel to the headwaters of the Big Thompson River, a tributary of the South Platte River, where it will be restored for release as needed for irrigation.

Construction of Green Mountain Dam and power plant on the Blue River was 36 percent completed on June 30.

After two unsuccessful attempts to obtain reasonable bids, the plan to construct the Continental Divide Tunnel under one contract was abandoned and, on April 8, bids were received for the excavation and installation of supports and steel liner plates of 8,000 feet of tunnel at the outlet or eastern end. The contract was awarded to S. S. Magoffin of Englewood, Colo., on April 24, at the bid price of \$471,123, the lowest of 13 received. Work was started in May and at the end of June was about 5 percent complete. Bids for similar work on a 6,600 foot section at the inlet end were received on June 20.

Marshall Ford Dam

On the Colorado River project in Texas the construction of Marshall Ford Dam to the 190-foot height was advanced to 97 percent of completion. Funds appropriated for fiscal year 1941 make possible the continuation of construction of the high dam for flood control and power generation. Bids for the construction of the addition were received on June 14. The low bid, in the amount of \$3,137,495, for the completion of the concrete section was presented by Brown & Root, Inc., and McKenzie Construction Co., that for the construction of the earth embankment portion of the dam was presented by Cage Bros. and W. W. Mann & Co. in the amount of \$903,102.

By enlarging the dam, a reservoir of 3,120,000 acre-feet capacity will be provided, to be used jointly for flood control, power, and river regulation to augment the low water flow for irrigation purposes along the Colorado River below Austin.

Other Construction

On the Roza Division of the Yakima project, Washington, where 72,000 acres will be irrigated, approximately 41 miles of the 99-mile canal, including five tunnels totaling about 24,000 feet, a 1,500-foot concrete siphon under the Yakima River, and 1.3 miles of bench flume had been completed at the end of June. Construction of wasteways Nos. 2 and 3 was well under way.

The 27-mile Black Canyon Canal, the "A" line and "D" line branch canals, several wasteways and the entire lateral system to serve 27,000 acres of gravity lands had been completed for the Payette Division of the Boise Project in Idaho. This division will add 50,000 acres to one of the oldest and largest Federal Reclamation projects. Some of the land is public land which will be open for settlement.

Twenty-three miles of the 28-mile Heart Mountain Canal had been completed for the Heart Mountain Division of the Shoshone project in Wyoming, comprising approximately 41,000 acres of irrigable land. During the year work was started on the control works at Shoshone Dam and on the construction of 40 miles of laterals. These contracts were respectively 80 percent and 21 percent completed at the end of the year.

On the Gila project in Arizona, the Gravity Main Canal was completed to carry water diverted from the Colorado River at Imperial Dam to 150,000 acres comprising the first unit of the project, most of which is public land that will later be opened for settlement. Bids had been opened for the construction of the first pumping plant, located a distance of 21 miles from the dam. Equipment had been ordered.

Three major contracts were awarded in January for the construction of a 25-mile section of the 67-mile Conchas Canal, Tucumcari project, which will carry water stored by Conchas Dam for the irrigation of 45,000 acres of agricultural land in northeastern New Mexico. Good progress had been made on the work to the end of the year. Another section of canal was being constructed with W. P. A. forces and a good start had been made on this work.

On the Kendrick project in Wyoming the main canal to mile 62.5 had been completed, as had about 50 percent of the 250 miles of lateral system to serve the first unit of 40,000 acres. Construction of one drain was started. The main electrical transmission lines of the project were all completed at the end of the year.

Two major transmission lines were constructed from Parker Dam, Arizona-California, one to Phoenix and the other to Blaisdell in the vicinity of Yuma. Construction of the power plant at Parker Dam

was started and equipment ordered for three of the four 30,000-kilowatt units proposed for ultimate installation.

At the Elephant Butte Dam, Rio Grande project, the powerhouse building was completed and equipment was being installed. The plant has a total installed capacity of 24,300 kilowatts consisting of three 8,100-kilowatt units. Construction of the 62.5-mile transmission line to Las Cruces was started in June.

Other regular projects on which work was under way during the year were Carlsbad in New Mexico, Riverton in Wyoming, Sun River in Montana, Uncompahgre in Colorado, and Upper Snake River Storage, Idaho-Wyoming.

CUMULATIVE CONSTRUCTION RESULTS

In the 38 years of its existence, the Bureau of Reclamation has completed the following construction: 161 storage and diversion dams; 51 powerhouses; 3,058 buildings; 20,575.9 miles of canals, ditches, and drains; 878 miles of tunnels; 4,802.5 miles of telephone lines; 300.5 miles of dikes; 6,377 flumes; 21,525 culverts; 13,912 bridges; and 202,491 other irrigation structures.

Reservoirs of the Bureau of Reclamation had a combined capacity of 51,215,000 acre-feet at the end of the fiscal year.

POWER

The completion of the Seminole power plant of the Kendrick project brought to 24 the number of power plants which were operated on Bureau of Reclamation projects during the fiscal year. The plants are located on 14 projects. Their total output during the year was 3,295,510,126 kilowatt hours, of which 3,211,355,677 kilowatt-hours were sold, resulting in gross revenues of \$7,866,994.76. Of this the Boulder power plant accounted for \$4,461,393.89 from 2,801,703,774 kilowatt-hours sold out of 2,834,248,000 kilowatt-hours generated.

The Seminole power plant is located at the toe of Seminole Dam on the North Platte River in Wyoming. It has an installation of three 10,800 kilowatt units and will have an average annual output of 140,000,000 kilowatt-hours of energy. Transmission lines have been constructed to Casper, Rawlins, and through Laramie to Cheyenne, from where branch lines extend to Gering, Nebr., and Greeley, Colo. Delivery of power from the plant was started in August 1939.

The eighth large generator was placed in service at the Boulder power plant in September 1939. Turbines for the ninth and tenth units were being installed at the end of the year and specifications for the turbine for the eleventh were issued in June.

Three 30,000 kilowatt units for the Parker power plant were ordered in February. These were expected to be ready to operate in the Fall of 1941. Contracts had been completed or were being negotiated which would utilize the full capacity of the three units, and there is sufficient market to justify the immediate installation of the fourth unit.

The Elephant Butte power plant on the Rio Grande project was nearing completion and will be placed in operation during the fall of 1940. Contracts had been completed or were being negotiated which would utilize the 90,000,000 kilowatt-hours of energy to be available annually.

The station service units at the Grand Coulee power plant, Columbia Basin project, will start operating during the fall of 1940. Three of the main units had been ordered. Power plants were also under construction by the Bureau of Reclamation at Shasta Dam, Central Valley project, and Green Mountain Dam, Colorado-Big Thompson project. At Marshall Ford Dam, in Texas, the Lower Colorado River Authority is installing the power plant.

RECLAMATION FUND

Accretions to the reclamation fund remained at a low level as will be indicated by the table below:

Accretions to Reclamation Fund, by States

States	Sale of public lands		Proceeds from Oil Leasing Act		Total to June 30, 1940
	Fiscal year 1940	To June 30, 1940	Fiscal year 1940	To June 30, 1940	
Alabama.....			\$3,207.75	\$191,373.16	\$191,373.16
Arizona.....	\$4,035.97	\$2,729,300.41	1,907.78	2,067.98	2,731,368.39
California.....	3,507.44	8,234,042.67	1,067,919.37	18,396,421.61	26,630,464.18
Colorado.....	2,920.80	10,301,694.15	57,640.72	822,693.15	11,124,387.30
Idaho.....	4,122.68	7,033,745.11	99.06	21,046.85	7,054,791.96
Kansas.....	35.52	1,033,461.91	104.38	219.88	1,033,681.79
Louisiana.....			39,711.53	276,996.42	276,996.42
Mississippi.....				11.55	11.55
Montana.....	1,938.60	15,371,319.48	51,129.98	1,362,673.72	16,733,993.20
Nebraska.....	283.24	2,095,022.65	73.50	147.00	2,095,169.65
Nevada.....	420.38	1,033,949.54	82.57	5,614.22	1,039,563.76
New Mexico.....	4,659.59	6,712,871.11	386,063.26	2,185,854.85	8,898,725.96
North Dakota.....	95.65	12,219,916.28	9,138.51	188,940.93	12,408,857.21
Oklahoma.....	9.60	5,929,742.17	22.84	22.84	5,929,765.01
Oregon.....	1,912.73	11,996,340.61		186.82	11,996,527.43
South Dakota.....	215.56	7,734,392.90	501.45	3,310.22	7,737,703.12
Utah.....	2,730.28	4,366,302.07	62,567.86	743,575.22	5,109,877.29
Washington.....	415.47	7,462,423.40	1,525.38	35,275.01	7,497,698.41
Wyoming.....	4,259.03	8,695,462.84	818,866.23	36,992,284.12	45,687,746.96
Total.....	31,562.54	112,949,987.30	2,500,562.17	61,228,715.45	174,178,702.75
Proceeds, Federal water power licenses.....					¹ 828,455.07
Proceeds, potassium royalties and rentals.....					² 657,555.67
Receipts from Naval Petroleum Reserves, 1920 to 1938, act of May 9, 1938.....					29,778,300.23
Grand total.....					205,443,013.72

¹ Proceeds for fiscal year, \$25,864.16.

² Proceeds for fiscal year, \$156,800.09.

The effect of the provision that repayments of allotments made from emergency funds to reclamation projects be deposited in the reclamation fund has not as yet been felt, and it is not expected to be felt for several years, owing to the fact that the projects on which this money was expended, for the most part, are not completed.

As a consequence, it is anticipated that by the close of the 1942 fiscal year the reclamation fund will be so depleted that it will be unable to carry the construction of all the projects now being financed from the fund. Two means of correcting this situation, which soon may become critical, are suggested. Either the reclamation fund should be increased by an advance from the General Fund of the Treasury, or certain of the more costly of the projects now being constructed by appropriations from the fund should be financed by appropriations from the General Fund of the Treasury or in other ways.

Repayments

Construction payments during the year totaled \$2,293,980.25; operation and maintenance collections amounted to \$1,101,522.51; and water rental receipts were \$503,549.67. Arrearages at the close of the fiscal year were: Construction, \$1,442,705.95; operation and maintenance, \$243,645.43; and water rental, \$171,526.85; amounts which represent slight increases over comparable figures for the previous year. Operation of the Reclamation Project Act of 1939 in future years should largely correct situations resulting in such delinquencies.

Status of Reclamation Fund

Accretions to the fund:

Sales of public lands-----	\$112, 949, 987. 30
Royalties and rental under Mineral Leasing Act-----	61, 228, 715. 45
Potassium royalties and rentals-----	657, 555. 67
Federal water-power licenses-----	828, 455. 07
Receipts from Naval Petroleum Reserves, 1920 to 1938, act of May 9, 1939-----	29, 778, 300. 23
Total accretions-----	205, 443, 013. 72
Collections—construction and operation and maintenance repay- ments, water rentals, power and light, etc-----	129, 503, 277. 60
Total cash available-----	334, 946, 291. 32
Disbursements-----	318, 592, 492. 40
Balance in fund June 30, 1940-----	16, 353, 798. 92

Accounts Receivable, Construction Water-right Charges

State and project	Due		Collected			Uncollected, June 30, 1940
	Fiscal year 1940	To June 30, 1940	Cash		Other credits to June 30, 1940	
			Fiscal year 1940	To June 30, 1940		
Arizona:						
Salt River.....	\$50,000.00	\$7,449,318.81	\$50,000.00	\$7,449,318.81		
Yuma Auxiliary.....	2,395.29	578,413.91	3,123.46	576,398.95	\$1,764.14	\$250.82
Arizona-California:						
Yuma.....	144,942.69	4,642,567.35	71,111.00	3,799,949.16	767,248.14	75,370.05
California: Orland.....	27,627.95	882,051.08	22,110.45	849,361.18		32,689.90
Colorado:						
Grand Valley.....	55,666.18	364,432.50	28,951.54	170,805.07	193,111.45	515.98
Uncompahgre.....	78,430.36	774,040.88	16,436.07	498,870.50	66,735.02	208,435.36
Idaho:						
Boise.....	298,627.53	4,945,330.16	295,238.55	4,907,525.31	27,193.29	10,611.56
Minidoka.....	145,428.77	9,059,281.25	204,762.54	7,951,405.52	931,715.18	176,160.55
Upper Snake River.....	35,750.00	35,750.00				35,750.00
Montana:						
Bitter Root.....	¹ 26,913.05	81,453.73	27,341.76	81,453.73		
Frenchtown.....	1,250.00	1,250.00	625.00	625.00		625.00
Huntley.....	17,337.28	624,119.89	16,442.95	525,195.06	98,069.65	855.18
Milk River.....	18,853.15	190,817.17	26,780.59	85,385.55		105,431.62
Sun River.....	32,365.64	377,917.96	22,116.23	314,782.08	49,042.65	14,093.23
Montana-North Dakota:						
Lower Yellowstone.....	72,242.05	537,475.42	66,482.86	494,727.08	1,811.45	40,936.89
Nebraska-Wyoming:						
North Platte.....	299,142.25	5,140,789.85	108,083.66	3,176,325.36	1,906,458.55	58,005.94
Nevada: Newlands.....	85,960.22	1,458,095.71	80,780.94	1,358,023.73	95,643.17	4,428.81
New Mexico: Carlsbad.....	14,474.24	932,558.09	15,625.46	925,267.26	81.25	7,209.58
New Mexico-Texas: Rio Grande.....	244,761.53	4,017,790.79	114,326.94	3,401,997.88	615,792.91	
Oregon:						
Baker.....	5,769.50	20,193.25	5,769.50	20,193.25		
Burnt River.....	7,500.00	7,500.00	7,500.00	7,500.00		
Stanfield.....	2,508.47	2,508.47	2,508.47	2,508.47		
Umatilla.....	14,758.31	664,629.03	2,660.39	414,746.74	5,669.44	244,212.85
Oregon-California: Klamath.....	90,259.46	1,445,471.16	102,206.74	1,409,783.94	7,948.25	27,738.97
Oregon-Idaho: Owyhee.....	10,000.00	10,000.00	9,914.52	9,914.52		85.48
South Dakota: Belle Fourche.....	¹ 39,092.74	716,744.46	14,491.56	604,168.35	83,856.55	28,719.56
Utah:						
Hyrum.....		23,250.00				23,250.00
Salt Lake Basin.....	88,192.90	392,856.39	88,192.90	392,856.39		
Sanpete.....	2,375.00	2,375.00	2,375.00	2,375.00		
Strawberry Valley.....	79,408.63	1,633,965.54	78,658.63	1,620,077.32	13,888.22	
Washington:						
Okanogan.....	¹ 10,000.00	148,327.74		138,327.74		10,000.00
Yakima.....	259,290.22	8,003,892.61	338,825.67	7,580,494.87	86,668.41	336,729.33
Wyoming: Shoshone.....	46,509.61	1,146,923.87	45,148.98	978,495.04	167,829.54	599.29
Total.....	2,155,821.44	56,312,092.07	1,868,592.36	49,748,858.86	² 5,120,527.26	1,442,705.95
Paid in advance of due dates.....			27,851.89	389,540.35	³ 220,529.34	
Refunds.....				100,225.10	3,212.84	
Total collections.....			1,896,444.25	50,238,624.31		
Contributed funds applying to construction cost not included in above table.....			54,900.00	2,101,258.83		

¹ Contra.² Other credits for fiscal year, \$425,387.89.³ Decrease for fiscal year, \$7,177.64.

Accounts Receivable, Operation and Maintenance Charges (After Public Notice)

State project	Due		Collected			Uncollected, June 30, 1940
	Fiscal year 1940	To June 30, 1940	Cash		Other credits to June 30, 1940	
			Fiscal year 1940	To June 30, 1940		
Arizona: Yuma auxiliary	\$13,250.09	\$546,702.19	\$12,524.83	\$528,575.02	\$13,816.35	\$4,310.82
Arizona-California: Yuma	153,453.66	4,486,724.70	134,837.80	4,265,931.13	197,841.63	22,951.94
California: Orland	36,291.35	779,626.38	35,517.06	737,402.86	25,757.82	16,465.70
Colorado:						
Grand Valley	49,994.21	606,989.59	49,994.21	573,989.59	33,000.00	
Uncompahgre		1,008,683.69		977,809.79	30,873.90	
Idaho:						
Boise	11,912.95	2,237,040.24	11,912.95	2,184,390.52	52,649.72	
King Hill		60,711.27		59,192.22	1,519.05	
Minidoka	57,065.21	2,377,951.46	44,067.72	2,204,578.64	141,715.43	31,657.36
Upper Snake River	10,000.00	10,000.00	9,952.33	9,952.33		47.67
Montana:						
Huntley		554,787.34		543,594.31	11,193.03	
Milk River	52,404.14	575,530.88	51,559.09	545,084.40	1,662.25	28,784.23
Sun River	1 31.23	168,687.27	1 31.23	164,335.05	4,352.22	
Montana-North Dakota:						
Lower Yellowstone		338,562.56		338,557.93	4.63	
Nebraska-Wyoming:						
North Platte	24,149.50	2,027,258.50	23,437.90	1,949,150.45	67,220.62	10,887.43
Nevada: Newlands		1,174,581.57		1,135,901.55	38,680.02	
New Mexico: Carlsbad	46,690.17	1,132,514.86	46,690.17	1,115,642.15	16,872.71	
New Mexico-Texas: Rio Grande	280,091.94	5,576,473.13	265,828.50	5,295,346.37	281,126.76	
North Dakota:						
Buford-Trenton		2,317.41		2,317.41		
Williston		34,042.75		34,042.75		
Oregon:						
Umatilla	3,258.97	402,034.66	3,893.27	394,770.86	7,253.96	9.84
Vale	25,131.54	109,546.93	25,131.54	109,546.93		
Oregon-California: Klamath	63,228.66	1,565,609.95	63,233.70	1,530,944.71	30,536.22	4,129.02
Oregon-Idaho: Owyhee	1 3,643.44	42,917.21	1 3,643.44	42,917.21		
South Dakota: Belle Fourche	64,000.00	1,449,787.28	64,000.00	1,440,411.29	9,375.99	
Utah: Strawberry Valley		376,880.88		365,022.21	11,858.67	
Washington:						
Okanogan		371,441.72		368,788.67	2,653.05	
Yakima	245,374.25	6,540,887.18	240,866.24	6,341,566.63	76,870.11	122,450.44
Wyoming: Shoshone	3,892.51	567,941.18	3,262.29	542,284.80	23,705.43	1,950.95
Total	1,136,514.48	35,126,232.78	1,083,034.93	33,802,047.78	2 1,080,539.57	243,645.43
Paid in advance of due dates			50,465.43	215,425.64	3 10,626.10	
Penalties and interest			7,108.08	549,308.88	4 20,503.43	
Refunds				38,241.47	156.00	
Total collections			1,140,608.44	34,605,023.77		

¹ Contra.² Other credits for fiscal year, \$18,487.58.³ Decrease for fiscal year, \$4,244.61.⁴ Increase for fiscal year, \$3.54.

Accounts Receivable, Rentals of Irrigation Water

State project	Due		Collected			Uncollected June 30, 1940
	Fiscal year 1940	To June 30, 1940	Cash		Other credits to June 30, 1940	
			Fiscal year 1940	To June 30, 1940		
Arizona:						
Salt River.....		\$2, 246, 726. 01		\$2, 246, 726. 01		
Yuma Auxiliary.....	\$1, 620. 02	18, 548. 48	\$877. 45	17, 048. 48	\$1, 500. 00	
Arizona-California:						
Yuma.....	6, 375. 73	590, 871. 60	5, 977. 73	577, 772. 41	12, 654. 19	\$445. 00
Central Valley.....	8, 700. 00	8, 700. 00				8, 700. 00
California: Orland.....	207. 12	121, 890. 29	207. 12	121, 890. 29		
Colorado:						
Fruit Growers Res.....	2, 500. 00	2, 500. 00	2, 500. 00	2, 500. 00		
Grand Valley.....	10, 896. 22	566, 432. 28	9, 921. 22	558, 956. 61	6, 500. 67	975. 00
Uncompahgre.....	2, 167. 36	1, 237, 948. 68	1, 036. 24	1, 223, 748. 22		14, 200. 46
Idaho:						
Boise.....	8, 050. 00	838, 238. 57	8, 050. 00	833, 518. 07	4, 720. 50	
Boise-Payette.....	30, 696. 71	32, 185. 26	16, 812. 94	18, 118. 49		14, 066. 77
Minidoka.....	59, 464. 99	973, 083. 99	60, 014. 99	968, 525. 98	3, 383. 01	1, 175. 00
Montana:						
Huntley.....	521. 87	14, 640. 70	521. 87	14, 640. 70		
Milk River.....	628. 37	239, 701. 07	628. 37	229, 754. 43	1, 208. 14	8, 738. 50
Sun River.....	44. 71	132, 714. 64	93. 09	130, 852. 31	1, 366. 62	495. 71
Montana-North Dakota: Lower Yellowstone.....	765. 00	138, 974. 00	372. 60	137, 523. 38		1, 450. 62
Nebraska-Wyoming: North Platte.....	2, 397. 75	356, 565. 92	2, 397. 75	356, 555. 92	10. 00	
Nevada: Newlands.....		28, 291. 16		22, 114. 31	6, 176. 85	
New Mexico:						
Carlsbad.....	100. 00	41, 392. 59	100. 00	41, 392. 59		
Hondo.....		9, 129. 70		9, 129. 70		
New Mexico-Texas: Rio Grande.....	149, 542. 92	1, 843, 294. 23	154, 819. 29	1, 827, 794. 23		15, 500. 00
North Dakota:						
Buford-Trenton.....		31. 75		31. 75		
Williston.....		2, 117. 28		2, 117. 28		
Oregon:						
Umatilla.....	2, 230. 55	106, 934. 32	2, 230. 55	80, 657. 52		26, 276. 80
Vale.....	1 ³ 63. 06	21, 509. 15	91. 77	21, 509. 15		
Oregon-California: Klamath.....	57, 758. 60	620, 637. 01	57, 502. 36	614, 548. 71	25. 00	6, 063. 30
Oregon-Idaho: Owyhee.....	96, 448. 86	326, 662. 78	112, 069. 31	308, 783. 58		17, 879. 20
South Dakota: Belle Fourche.....	425. 55	12, 571. 00	695. 85	12, 553. 20	17. 80	
Utah: Strawberry Valley.....		17, 596. 13		17, 596. 13		
Washington:						
Okanogan.....		110, 645. 28		108, 061. 09	2, 584. 19	
Yakima.....	20, 143. 04	245, 846. 06	2, 186. 80	186, 662. 97	4, 082. 69	55, 100. 40
Wyoming:						
Riverton.....	48, 496. 36	223, 459. 77	46, 534. 93	208, 439. 81	14, 656. 25	363. 71
Shoshone.....	14, 512. 86	152, 368. 36	14, 268. 55	148, 222. 32	4, 049. 66	96. 38
Total.....	524, 631. 53	11, 282, 208. 06	499, 910. 78	11, 047, 745. 64	² 62, 935. 57	171, 526. 85

¹ Contra.² Other credits for fiscal year, \$3,638.89.

POPULATION OF THE PROJECTS

There was a slight increase during the past year in the number of farms irrigated, bringing the total to 53,205. The population on these farms was 227,835. The 1940 census made possible the revision of population figures for the 258 towns on or directly tributary to the projects, which, with the elimination of one duplication, gives a corrected figure of 609,782 as compared to 676,928 in 1939. The combined population of these towns and the irrigated farms is 837,617.

Within the areas thus developed as the result of the construction of the Federal irrigation systems there have been established 937 schools and 1,148 churches. There were 108 banks serving the settlers of the project farms and towns.

Settlement and Economic Data, Fiscal Year 1940

State	Project	Irrigated farms		Towns on or tributary to the project		Number of schools	Number of churches	Banks			
		Number	Population	Number	Population			Number	Capital stock	Deposits	Number of depositors
Arizona.....	Salt River.....	9,000	68,000	12	85,957	91	152	8	2,594,100	\$42,488,864	45,957
Arizona-California.....	Yuma.....	1,592	3,337	5	8,700	13	27	1	550,000	1,662,857	2,095
California.....	Orland.....	679	2,048	1	1,362	9	10	1	(1)	968,526	2,967
Colorado.....	Grand Valley.....	526	1,672	6	19,950	17	38	3	275,000	4,360,400	8,100
	Uncompahgre.....	1,714	6,355	3	8,900	28	37	4	325,000	3,720,814	7,182
Idaho.....	Boise.....	4,050	16,000	16	50,579	118	130	4	(1)	(1)	(1)
	Minidoka.....	3,499	11,755	10	14,840	34	70	7	(1)	(1)	(1)
Montana.....	Bitter Root.....	337	1,901	5	6,000	18	13	4	140,000	1,915,089	4,350
	Frenchtown.....	35	1,150	2	130	2	1	0	0	0	0
	Huntley.....	630	1,793	5	814	8	6	1	25,000	170,651	300
	Milk River.....	691	2,684	17	11,605	33	36	7	290,000	4,318,336	7,770
Montana-North Dakota.....	Sun River.....	805	2,387	5	1,096	7	11	1	25,000	207,000	650
Nebraska-Wyoming.....	Lower Yellowstone.....	676	3,595	7	4,155	18	22	2	80,000	1,150,000	2,600
Nevada.....	North Platte.....	3,163	9,936	17	23,196	71	46	9	405,000	6,225,981	12,650
	Humboldt.....	56	230	1	1,290	4	4	1	60,000	992,606	1,300
	Newlands.....	729	2,683	4	2,298	16	12	1	0	946,000	1,555
	Truckee Storage.....	425	1,800	2	26,566	25	19	4	700,000	21,298,726	19,674
New Mexico.....	Carlsbad.....	461	2,200	4	9,750	9	12	2	100,000	1,894,088	2,975
New Mexico-Texas.....	Rio Grande.....	5,990	25,458	36	125,029	88	128	6	775,000	39,558,947	34,222
Oregon.....	Umatilla.....	459	1,631	5	1,655	7	12	1	25,000	415,591	1,322
	Vale.....	430	1,680	3	1,600	5	12	1	(1)	(1)	(1)
Oregon-California.....	Klamath.....	936	2,732	5	27,458	30	35	5	(1)	(1)	(1)
Oregon-Idaho.....	Owyhee.....	1,706	6,630	5	7,300	28	23	2	(1)	(1)	(1)
South Dakota.....	Belle Fourche.....	900	2,265	5	3,699	28	17	3	(1)	(1)	(1)
Utah.....	Hyrum.....	516	1,500	3	3,700	5	5	0	0	0	0
	Moan Lake.....	600	2,550	5	2,045	15	23	1	46,000	442,000	1,600
	Ogden River.....	1,109	3,500	6	50,525	25	56	4	698,000	21,648,000	30,000
	Sanpete.....	210	1,160	2	3,087	7	6	1	70,000	504,000	850
	Strawberry Valley.....	1,800	7,500	11	14,600	22	20	3	165,000	2,444,022	6,927
	Weber River.....	2,100	10,000	12	9,492	46	50	7	680,000	21,450,000	25,000
Washington.....	Okanogan.....	373	944	3	4,735	9	8	2	75,000	1,166,812	2,585
	Yakima.....	5,442	17,400	23	51,826	78	62	8	1,900,000	7,235,647	13,634
Wyoming.....	Kendrick.....	0	0	4	21,000	17	23	2	500,000	9,217,811	12,000
	Riverton.....	495	1,730	3	2,627	3	13	1	30,000	540,300	1,300
	Shoshone.....	1,071	2,629	5	2,207	3	9	1	35,000	645,069	1,400
Total.....		53,205	227,835	258	609,782	937	1,148	108	10,613,100	200,268,411	255,465

1 Data not reported.

OPERATION AND MAINTENANCE

The usual operation and maintenance work was continued on all of the government projects, 25 of which are under the supervision of water users' organizations and 16 remain under the care of the Bureau. The cost of operation and maintenance on practically all projects is covered by funds advanced by water users. With few exceptions the Bureau has retained the care and operation of storage dams and reservoirs.

In addition to routine activities connected with the delivery of water to the project farms, educational work had been continued for the purpose of bringing about more economical and efficient use of water by limiting the supply to that which is required for maximum crop production and thereby avoiding the seepage of cultivated areas, the leaching of valuable plant food and soil erosion. This had been accomplished chiefly through the use of motion pictures presented in cooperation with water users' organizations, State Colleges, and county agricultural agents.

Investigations had been continued for the purpose of finding a cheap and efficient method of reducing the loss of water as it flows through canals from the point of diversion to the irrigated farms. Concrete is effective but expensive. The experience that had been gained in the use of bentonite, a kind of clay that swells several times its original volume when wet, indicated that this material could be used to advantage in canals excavated in porous sand and gravel. Satisfactory results can be obtained for reasonable costs, there being many deposits of this clay in the western section of the United States.

The eradication of noxious weeds continued to receive a good deal of attention and encouraging results had been obtained on several of the projects through the efforts of local officials in organizing weed districts and in carrying on energetic and effective weed control campaigns. Studies were continued to determine the best methods of controlling perennial weeds that were classified by law as noxious in nearly all of the western states. Educational work in the control of weeds was also carried on in part by the use of moving pictures.

LANDS OPENED TO HOMESTEAD ENTRY

During the fiscal year three blocks of land on two projects were opened to homestead entry. These gave opportunity for the settlement of 260 farm units with an irrigable area of 23,540 acres. On November 28, 1939, 39 units on the Riverton project, in Wyoming, were made available to qualified applicants, and on the Sun River project, in Montana, two public notices were issued, one of October 25, 1939, opening 81 farm units, and the second one opened 140 additional units

on April 22, 1940. The Farm Security Administration, as authorized by the Act of August 7, 1939, has cooperated in connection with all three of these openings by furnishing financial assistance to worthy applicants who were otherwise qualified under departmental regulations to enter a reclamation farm unit. In all three cases more applications were received prior to the date of opening than there were farms available. There has been a constant demand for public land farms, and plans were being made at the end of the year for the initial public notice covering lands on the newly constructed portion of the Payette division of the Boise project, Idaho, where 46 units were soon to be ready for homestead entry. The provisions of the act of August 7, 1939 have been extended so that financial assistance can be given to settlers throughout the fiscal year 1941.

REPAYMENT LEGISLATION

Of great importance is the Reclamation Project Act of 1939 (Public, No. 260, 76th Cong.) enacted into law August 4, 1939. This act provides specific measures for adjusting the economic and financial problems that have arisen on Federal reclamation projects. It makes possible the drafting of new contracts gearing repayments to the ability year by year of the farmers to make payments, the reclassifying of lands from time to time, and the accomplishment of other needed reforms.

In section 3 of this act provision is made for granting an extension of time for the payment of construction charges, where justified, of not more than 40 years from the date of the first installment or not to exceed double the number of remaining years. Section 4 provides for an adjustment of annual charges based upon the normal and percentage plan, with an increase or decrease in payments as crop values increase or decrease from normal values. Where adequate relief cannot be granted under the provisions of sections 3 or 4, the act provides, in section 7, for the negotiation of new contracts which will provide for fair and equitable treatment of the repayment problems, but such contracts may be executed on behalf of the United States only after approval thereof has been given by act of Congress. There are a few projects where adjustments can be made under the provision of section 3, a few more under section 4, but most of the projects where some measure of relief is needed will have to be considered under the provisions of section 7.

Section 8 of the 1939 act authorizes the Secretary to reclassify the irrigable land where justified. Requests had been received and plans made to reclassify the irrigable lands on 10 or more projects or divisions of projects during the season of 1940. One-half of the

estimated cost of reclassification must be advanced by the water users.

For the purpose of obtaining the views of a committee familiar with irrigated farming, a majority of whose members are not directly connected with the Bureau of Reclamation, the Secretary selected Mr. William Peterson, director of extension service, Utah Agricultural College; Dr. Wilbur L. Powers, soil scientist, Oregon State College; and Mr. B. E. Hayden, project superintendent, Bureau of Reclamation, Klamath project, Oregon, to visit certain projects, study the economic and financial conditions and report to the Secretary. This committee did not start on investigations until after the close of the fiscal year, but will visit and submit reports on 11 Federal projects. There will probably be about 25 projects where readjustments will have to be made, most of which will have to be handled under the provisions of section 7.

This new legislation should obviate the necessity in the future of extending blanket moratoria on repayments, even under severely depressed conditions.

RELIEF EXTENDED TO WATER USERS

The act of May 31, 1939 (Public, No. 97, 76th Cong.) authorized the Secretary to extend relief to water users who were unable to pay, without great hardship, construction charges for the calendar year 1938 and prior years. Section 17 (b) of the Reclamation Project Act of 1939 extended the provisions of the act of May 31 whereby the Secretary could grant relief in the payment of construction charges for each of the years 1939 to 1943, inclusive. Pursuant to this authority the Secretary has granted relief in the payment of construction charges for 1939 to 17 districts amounting to \$528,222.13. Approximately one-half of this sum is confined to two projects which heretofore have promptly paid their contract obligations, one being the Salt River project in Arizona where relief was granted because of a serious shortage in the water supply for 1939, and the other, the Imperial Irrigation District of California, where excessive rainfall and floods in September 1939 caused extensive damage to the canal system.

CROP RESULTS

The average value per acre in the calendar year 1939 of crops on Government reclamation projects was \$37.06 which is 25 cents less than in 1938. There were some slight increases in the area in cultivation, from 3,040,695 in 1938 to 3,078,072 in 1939, but nearly all of the increase of 37,377 acres resulted from the addition of Burnt River and Stanfield projects in Oregon, and the Humboldt project

in Nevada, which appear in the crop tabulation for the first time and are carried in the column headed, "Projects furnished supplemental water." The Bureau was prepared to supply water to 3,889,540 acres in 1939, or an increase of 103,607 acres over 1938, chiefly owing to the completion of certain projects and extension of the canal system on other projects. The total value of crops on all projects was \$114,082,794, an increase of \$619,334 over 1938.

The water shortage on the Belle Fourche project in South Dakota continued through 1940 and less than half of the quantity required for the production of good crops was available for the cultivated acreage. The Salt River project in Arizona also experienced a water shortage but was able to come through the season by drawing on underground water which was pumped from wells and by making very careful use of the available supply.

Irrigation and Crop Results on Federal Reclamation Projects, 1939

State	Projects and divisions	Projects constructed by Bureau				Projects furnishing supplemental water				Projects furnished water under Warren Act	
		Irrigable acreage 1	Area in cultivation classes 1-4	Crop values		Irrigable acreage 1	Area in cultivation classes 1-4	Crop values		Irrigable acreage 1	Area in cultivation classes 1-4
				Total	Per acre			Total	Per acre		
Arizona	Salt River	Acres 243,125	Acres 227,159	\$15,935,708	\$70.15	Acres	Acres			Acres 58,044	Acres
	Yuma	68,013	53,023	2,458,230	46.36						
	Valley Division	50,269	44,493	2,014,952	45.29						
	Reservation Division	7,743	2,173	51,739	23.81						
	Bard Division	6,191	4,863	184,094	37.85						
California	Yuma Auxiliary (Mesa)	3,810	1,494	207,475	138.87						
	Orland	20,526	15,507	640,070	41.28						
	Grand Valley	30,413	19,405	665,557	34.30					18,427	16,200
	Uncompahgre	91,633	59,871	1,249,961	20.88					3,769	3,189
	Boise	178,770	152,502	3,657,105	23.98					126,955	113,100
Idaho	New York Irrigation District	17,763	14,873	207,313	13.94						
	Nampa-Meridian Irrigation District	41,101	34,924	792,966	22.69						
	Boise-Kuna Irrigation District	48,613	44,094	850,872	19.30						
	Wilder Irrigation District	59,322	48,889	1,559,846	31.91						
	Big Bend Irrigation District	1,818	1,352	22,614	16.75						
Montana	Black Canyon Irrigation District, Unit 1	6,894	6,405	204,872	31.99						
	Black Canyon Irrigation District, Unit 2	3,259	1,965	19,292	9.82						
	Minidoka	202,843	172,280	4,902,880	28.46					738,969	643,815
	Minidoka Irrigation District	71,222	60,286	2,030,414	33.08						
	Burley Irrigation District	47,937	43,780	1,554,903	35.52						
Montana	Gooding Division	83,684	68,154	1,317,563	19.33						
	Butler Root	21,888	16,010	281,878	17.61						
	Frenchtown	4,878	1,696	40,777	24.01						
	Humley	29,532	16,533	610,183	36.91						
	Milk River	123,848	42,640	1,181,383	27.71						

Irrigation and Crop Results on Federal Reclamation Projects, 1939—Continued

State	Projects and divisions	Projects constructed by Bureau				Projects furnishing supplemental water				Projects furnished water under Warren Act			
		Irrigable acreage	Area in cultivation classes 1-4	Crop values		Irrigable acreage	Area in cultivation classes 1-4	Crop values		Irrigable acreage	Area in cultivation classes 1-4	Crop values	
				Total	Per acre			Total	Per acre			Total	Per acre
Oregon-Idaho	Owyhee	Acres 100,089	Acres 73,345	\$1,856,611	\$22.31	Acres	Acres			Acres 13,900	Acres 11,690	\$840,360.0	\$229.99
	Advancement Irrigation District	683	609	15,124	44.83								
	Bench Irrigation District	2,312	2,174	90,235	21.51								
	Crystal Irrigation District	1,207	1,058	29,025	17.43								
	Owyhee Irrigation District	55,600	38,929	747,490	49.20								
	Payette-Oregon Slope Irrigation District	4,432	3,597	154,210	2.87								
	Ontario-Nyssa Irrigation District	5,690	4,936	175,882	35.63								
	Gem Irrigation District	29,041	21,442	630,010	29.38								
	Slide Irrigation District	1,124	600	14,635	24.39								
		72,746	34,222	821,222	24.00	89,484	86,984	\$3,670,291	\$42.19				
South Dakota Utah	Belle Fourche					8,329	5,948	200,087	33.74				
	Weber River (Salt Lake Basin)					18,549	11,940	487,655	40.84				
	Hyrum					12,750	10,811	115,638	10.70				
	Ogden River												
	Saupe					6,750	5,833	57,113	9.79				
						6,000	4,978	58,525	11.76	6,269	5,929	150,176	25.33
	Ephraim Division												
	Spring City Division	41,205	38,577	871,611	22.59								
	Strawberry Valley												
		19,012	17,780	301,717	16.97								
Washington	Highline Division	13,904	13,235	310,392	23.45								
	Spanish Fork Division	8,289	7,562	259,502	34.32								
	Springville-Mapleton Division												
		5,356	3,369	361,074	107.17								
	Okanogan	205,156	166,622	7,736,446	46.55								
	Yakima												
		105,433	84,684	3,188,272	37.65								
	Sunnyside Division	29,537	24,920	3,252,242	130.51								
	Tiefon Division	70,186	57,018	1,315,932	23.08								
	Kittitas Division									188,677	157,376	7,534,111	47.87

Wyoming.....	Riverton.....	Shoshone.....	642,424	22,011	347	347	6,035	17,391
			38,000	29,181				
			73,272	57,730				
Garland Division.....								
Frankie Division.....			41,627	33,458				
Willwood Division.....			20,040	14,147				
			11,605	10,125				
Total.....			2,310,419	1,754,266	182,321	149,003	5,181,953	40,313,140
								34,311
Total, Regular projects ²			2,310,419	1,754,266				
Total, Supplemental projects ³			182,321	149,003				
Total, Warren Act projects.....			1,396,800	1,174,803				
Grand total, 1939.....			3,889,540	3,078,072				
Grand total, 1938.....			3,782,933	3,040,695				
Increase (+) or decrease (-), 1938-39.....			+106,607	+37,377				
				+619,334				

² Projects constructed by the Bureau.

² Projects constructed by the Bureau.

SECONDARY AND GENERAL INVESTIGATIONS

Investigations of 100 potential projects were in progress during the fiscal year by the Bureau of Reclamation. Allotments of emergency funds and regular appropriations were being used.

The investigations are generally limited to (a) examinations of individual projects, including land classification, reservoir and canal surveys, economic and water-supply studies, (b) reconnaissance surveys of stream basins to determine irrigation potentialities within those basins, and (c) basin-wide surveys, including reconnaissance and examination of individual projects within the basin. The largest and practically the only basin-wide survey undertaken by the Bureau is that of the Colorado River Basin, the examination of which was authorized by section 15 of the Boulder Canyon Project Act approved December 21, 1928, which directs that investigation and public reports be made of the feasibility of projects for irrigation, generation of electrical power, and other purposes in the States of Arizona, Nevada, Colorado, New Mexico, Utah, and Wyoming. The status of progress is given in the following paragraphs.

Arizona**Colorado Basin surveys:**

Little Colorado River: Land classification and reservoir surveys, except geological explorations, completed; water supply and economic studies continued; and geological explorations in progress.

Hassayampa River: Land classification completed; reservoir and canal surveys and water-supply and economic studies continued; geological explorations and studies of underground water conditions in progress.

Williams River: Land classification completed; reservoir and canal surveys and water-supply and economic studies continued; geological explorations continued.

Arizona-Nevada**Colorado Basin surveys:**

Mojave: Canal surveys and water-supply studies in progress.

Bulls Head Reservoir: Reservoir and dam site topography and foundation explorations completed; water supply and power plant output studies in progress.

Arizona-California

Colorado Basin surveys: Palo Verde and Cibola Valleys: Land classification continued.

California**Colorado Basin surveys:**

Chuckawalla Valley: Land classification continued.

Kings River: Report completed and submitted to Congress.

Sacramento: Studies of water-supply requirements for lands in the Sacramento Valley, other than those to be supplied by the Shasta Reservoir, are in progress; land classification in the American River service area completed; inventory of irrigation possibilities in the American River Valley in progress; report on local irrigation from Sacramento River in progress.

Colorado

Western slope surveys:

Mancos (Mesa Verde National Park water supply): Memorandum report completed.

Florida Mesa: Report completed.

Paonia (North Fork): A supplemental report completed.

La Plata: Report completed.

Silt, Roan Creek, Troublesome, Piceance, Colbran, and Rifle Investigations:

Field surveys completed; water supply and economic studies continued.

Dolores-Montezuma-Dove Creek: Land clasification completed; gaging stations established on tributary streams; water supply studies in progress.

Upper Gunnison River: Land classification completed; gaging stations on tributaries established; water-supply studies in progress.

San Luis project: Report completed and submitted to Congress.

Grand Mesa: Land classification completed; reconnaissance made of potential reservoir sites.

Yampa River below Yampa, Colo.: Land classification completed; field surveys, water-supply, and economic studies continued.

Blue River-Platte River transmountain diversions: All field surveys and water-supply and economic studies completed; report in preparation.

Eastern slope surveys:

North Republican (Wray): Report completed.

Trinidad (Purgatoire): Preliminary draft of report completed.

Arikaree, South Republican, Smoky Hill, Huerfano, and Apishapa River Investigations: Field surveys completed; water-supply and economic studies continued.

Colorado-Kansas

Arkansas Valley: Field survey and water-supply and economic studies continued.

Colorado-New Mexico

Turley: General reconnaissance completed.

Ship Rock: Field surveys in progress.

Colorado-Wyoming

Little Snake: Reconnaissance made of potential reservoir sites; gaging stations on tributaries established; water-supply and economic studies in progress.

Idaho

Southwestern Idaho Investigations:

Boise project: Detailed geological explorations completed at Twin Springs Reservoir site; surveys completed at Anderson Ranch Reservoir site; report completed on the flood control power and irrigation values of the Twin Springs and Anderson Ranch Reservoir sites. Report on Anderson Ranch Reservoir site submitted to the Congress.

Weiser River: Surveys and geological explorations completed on several reservoir sites; water-supply and economic studies in progress; report on the Mann Creek storage project in preparation.

Mountain Home: Land classification continued.

Salmon River: Land classification and field surveys in progress.

South Fork of the Snake River: Preliminary report completed; flood control studies in progress.

Idaho-Montana

Madison River-Snake River Diversion: Possibility of diverting water from the Madison River to the Snake River has been given consideration in the past. Further work on this study is being carried on in connection with the investigation of the Missouri Valley above Great Falls, Mont.

Kansas

Western Kansas Reconnaissance: Reconnaissance surveys covering reservoir sites; and land classification and canal alignment along the tributaries of the Arkansas, Smoky Hill, and Republican Rivers in progress.

Montana

Missouri Valley above Great Falls: A comprehensive basin-wide study of potential irrigation and power developments in progress. Work is being done in cooperation with the Montana Power Co. and the Montana State Water Conservation Board. The investigation will include completion of studies for the Madison, Gallatin, and Dearborn Valleys, the Canyon Ferry dam site, and the Daley Spur Project.

Marias: Supplemental surveys in progress.

Rock Creek (Valley County): All field work completed, water-supply and economic studies continued.

Fort Peck Pumping: Land classification and canal surveys completed, water-supply studies, transmission-line surveys, and economic studies continued.

Missouri River Basin below Great Falls: General reconnaissance has been made of area in Chouteau County, on Teton River tributaries, and along the Sun River. Water-supply studies have been in progress for the Judith River and Flat Willow areas.

Yellowstone River: Investigations to determine storage possibilities in this basin are in progress.

Hardin Project: Land classification has been completed; canal surveys and water-supply studies in progress.

Bitter Root Valley: Land classification, and water-supply studies in progress.

Missoula Valley: Land-classification surveys in progress.

Deadman's Basin Project: Preliminary report prepared. Construction of project being completed with Reconstruction Finance and W. P. A. funds.

Nebraska

Mirage Flats: Report completed.

Cambridge Project: Field surveys started.

Nebraska-Colorado-Kansas

Republican River Reconnaissance: Field reconnaissance completed; report submitted.

Nebraska-Kansas

Bostwick Project: Field surveys started.

Nevada

Humboldt River: Water-supply studies continued.

Quinn Valley Reconnaissance: Report completed.

New Mexico

Middle Rio Grande: Inventory of present developed works together with economic and water supply studies started.
Pecos River Joint Investigations: Bureau is cooperating with other agencies and the National Resources Planning Board.

North Dakota

Missouri River Tributaries: Field surveys and water-supply and economic studies continued.
Sidney Pumping Extension: Preliminary report prepared.
Bismarck Project: Report completed.

North Dakota-South Dakota

Missouri River Pumping Projects: Field surveys of several potential pumping developments along the Missouri River have been completed. Water-supply and economic studies are being continued.
North Canadian River Investigation (Includes Fort Supply, Optimo, and Canton areas): Field work completed, economic and water supply studies continued. A preliminary progress report on the Fort Supply area has been submitted.
Mangum Project: Field surveys and land classification in progress.
Cache-Beaver Creek: Reconnaissance surveys completed and report submitted.
Wachita Reconnaissance: Field work completed and water supply studies in progress.

Oklahoma-New Mexico-Texas

South Canadian Reconnaissance: A preliminary field survey has been made of the area and water supply studies are in progress.

Oregon

Grande Ronde Project: Field work and water supply and economic studies continued.
Medford Project: Field work completed, supplemental report submitted.
Canby Project: Supplemental report on progress.
Jackson and Josephine Counties Cooperative Investigation: Field surveys in progress.
Willamette Basin: Preliminary reconnaissance completed.

South Dakota

Rapid Valley Project: Supplemental field work at Pactola Dam site completed.
Angostura Project: Supplemental field work completed, supplemental report submitted.
Buffalo Gap Project (Beaver Creek): Field work and water supply and economic studies continued.

Texas

Balmorhea Project: Detailed surveys and water supply and economic studies completed. Preparation of report in progress.
Robert Lee Project: Detailed surveys and water supply and economic studies continued.
Palo Duro Reconnaissance: Surveys and studies in progress.
Brazos River Reconnaissance: Field work started.

Utah

Colorado River Surveys:

Price-Gooseberry, Blue Bench, Ouray, Virgin River, Kanab Creek, Uinta Basin, Vernal-Ashley, and Emery County Projects: Field surveys, water supply and economic studies in progress.

Colorado-Great Basin Project: Land classification, geological surveys, water supply and economic studies in progress.

Salt Lake Basin Cooperative Surveys: Weber River, Woodruff, Big Creek, Otter Creek, Beaver Creek, Bally Watts Projects; Field surveys and water supply and economic studies in progress. Report on Newton project completed.

Utah Power Investigations: Power market studies and surveys of potential power reservoirs on the Colorado River in progress.

Washington

Columbia Basin Project: Land classification and appraisal surveys continued.

Yakima River Basin: Cooperative investigation with Army Engineers relative to flood control started.

Wyoming

Colorado Basin surveys: Green River Projects, including Daniels, Lyman, Pine-dale and Seeds-kadie: Field work and water supply and economic studies continued.

Eden Project: Field Surveys and water supply studies completed. Report submitted.

Big Horn Basin: Reconnaissances have been made of the Grey Bull, Shell Creek, Wood River, Gooseberry Creek, Nowood River, Owl Creek, and Fifteen Mile Creek areas. Soil surveys have been made of the Buffalo Basin, Schuster Flats, Grass Creek, and Cottonwood Creek areas. Water supply studies are in progress.

Wyoming-Montana

Powder and Tongue Rivers: Reconnaissance surveys, land classification and water supply studies in progress.

Wyoming-Utah-Idaho

Green River-Bear River Diversion: Reservoir and canal surveys and water supply and economic studies continued.

CIVILIAN CONSERVATION CORPS

The 44 C. C. C. camps allocated to the Bureau of Reclamation during the fiscal year 1940 continued their important work in connection with the rehabilitation of Federal Reclamation projects, the development of supplemental water supplies, the construction of new reclamation projects, and the development of recreational facilities at irrigation reservoirs.

A number of important features on several of the projects were completed by the C. C. C. camps during the fiscal year. Enrollees

completed a diversion dam and 10 miles of the Yellowstone feeder canal, both designed to supplement and insure an adequate supply of water for the Moon Lake project in northeastern Utah. Clear Lake Dam on the Klamath project in Oregon was raised 3 feet with C. C. C. forces, providing an additional storage of 84,000 acre-feet. The enrollees constructed a stone masonry parapet and curb wall across the top of the Agency Valley Dam in Oregon. On the Sunnyside Division of the Yakima project in Washington they erected, as a major job of rehabilitating part of the Mabton siphon, 1,550 feet of a continuous wood stave pipe, 56 inches in diameter.

Progress continued to be made in providing facilities for recreational purposes at irrigation reservoirs. The programs at Alcova Reservoir in Wyoming and at Alamogordo Reservoir in New Mexico were brought into a construction stage. A large fish hatchery constructed by C. C. C. forces at Elephant Butte Reservoir in New Mexico was completed and turned over to the Fish and Wildlife Service for operation and maintenance.

Well defined procedures were being developed, with the assistance of C. C. C. crews, for the eradication and control of noxious weeds on reclamation projects, the weed-control problems of the several projects varying under the different climatic conditions encountered. The facilities of the C. C. C. organization lend themselves well to the essential coordination of the laboratory and field work.

Seepage of irrigation water from the canals, with damage to adjacent lands and permanent loss of water for crop purposes, has long been a problem of importance in the operation of reclamation projects. The development of a method of sealing canals that will be economically feasible, has been an objective of the Bureau of Reclamation. C. C. C. forces are engaged on many projects in testing different types of canal linings under actual operating conditions. It is anticipated these experiments will lead to an increased conservation of valuable water otherwise lost to the projects.

The C. C. C. program on reclamation projects is essentially of a construction nature and is closely related to the regular activities of the Bureau. The enrollees are provided an excellent opportunity, not ordinarily afforded to young men of their age, in the building of water-control structures, the concrete lining of canals, and the use of heavy construction equipment. The operation and maintenance of the many trucks, tractors, scrapers, and shovels, which are used by all reclamation camps, give the enrollees specialized training ideally adapted to the highly mechanized industry of the present world.

ORGANIZATION

The Commissioner, appointed by the President and under the supervision of the Secretary, is in administrative charge of the Bureau of Reclamation. He is supported by a staff of 139 officers and employees in Washington. The Chief Engineer at Denver, Colo., assisted by 987 employees, is in general supervision of the engineering and construction activities. Twenty-five construction engineers in charge of projects now under construction, 4 engineers, a director of power at Boulder City, Nev., and 3 supervising engineers, located at Coulee Dam, Wash.; Sacramento, Calif.; and Estes Park, Colo., report to the Chief Engineer. Sixteen superintendents in charge of completed projects report to the Supervisor of Operation and Maintenance at Washington. The 55 field offices, including the Denver office and 5 field legal offices, have a combined personnel of 7,010.

Raymond W. Walter, Chief Engineer, died on June 30, 1940. He was succeeded by Sinclair O. Harper.

Irrigated Acres and Areas in Cultivation and Cumulative Crop Values, by Years, 1906-39

	Federal irrigation projects ¹				Warren Act lands				Entire area			
	Irrigated acreage	Net area in culti- vation	Total crop value		Irrigated acreage	Net area in culti- vation	Total crop value		Irrigated acreage	Net area in culti- vation	Total crop value	
			For year	Cumulative total			For year	Cumulative total			For year	Cumulative total
1906	22,300	2 20, 100	\$244, 900	\$5, 005, 360	22, 300	2 20, 100	\$244, 900	\$5, 005, 360	22, 300	2 20, 100	\$244, 900	\$5, 005, 360
1907	187, 628	2 169, 000	4, 760, 460	12, 641, 248	187, 628	2 169, 000	4, 760, 460	12, 641, 248	187, 628	2 169, 000	4, 760, 460	12, 641, 248
1908	289, 549	2 260, 500	7, 635, 888	24, 561, 911	289, 549	2 260, 500	7, 635, 888	24, 561, 911	289, 549	2 260, 500	7, 635, 888	24, 561, 911
1909	410, 628	2 369, 500	11, 920, 663	37, 506, 550	410, 628	2 369, 500	11, 920, 663	37, 506, 550	410, 628	2 369, 500	11, 920, 663	37, 506, 550
1910	471, 423	413, 000	12, 944, 639	50, 592, 991	471, 423	413, 000	12, 944, 639	50, 592, 991	471, 423	413, 000	12, 944, 639	50, 592, 991
1911	562, 311	470, 100	13, 086, 441	66, 600, 125	562, 311	470, 100	13, 086, 441	66, 600, 125	562, 311	470, 100	13, 086, 441	66, 600, 125
1912	614, 477	540, 000	16, 007, 134	82, 276, 534	614, 477	540, 000	16, 007, 134	82, 276, 534	614, 477	540, 000	16, 007, 134	82, 276, 534
1913	694, 142	637, 227	15, 676, 409	98, 752, 051	694, 142	637, 227	15, 676, 409	98, 752, 051	694, 142	637, 227	15, 676, 409	98, 752, 051
1914	761, 271	703, 424	16, 475, 517	116, 916, 503	761, 271	703, 424	16, 475, 517	116, 916, 503	761, 271	703, 424	16, 475, 517	116, 916, 503
1915	810, 649	760, 035	18, 164, 452	149, 732, 475	810, 649	760, 035	18, 164, 452	149, 732, 475	810, 649	760, 035	18, 164, 452	149, 732, 475
1916	922, 821	858, 291	32, 815, 972	206, 194, 788	922, 821	858, 291	32, 815, 972	206, 194, 788	922, 821	858, 291	32, 815, 972	206, 194, 788
1917	1, 026, 663	966, 784	56, 462, 313	273, 016, 184	1, 026, 663	966, 784	56, 462, 313	273, 016, 184	1, 026, 663	966, 784	56, 462, 313	273, 016, 184
1918	1, 119, 566	1, 051, 193	66, 821, 396	335, 478, 496	1, 119, 566	1, 051, 193	66, 821, 396	335, 478, 496	1, 119, 566	1, 051, 193	66, 821, 396	335, 478, 496
1919	1, 187, 255	1, 113, 469	88, 974, 137	428, 161, 971	1, 187, 255	1, 113, 469	88, 974, 137	428, 161, 971	1, 187, 255	1, 113, 469	88, 974, 137	428, 161, 971
1920	1, 223, 480	1, 153, 820	66, 171, 650	490, 624, 283	1, 223, 480	1, 153, 820	66, 171, 650	490, 624, 283	1, 223, 480	1, 153, 820	66, 171, 650	490, 624, 283
1921	1, 227, 500	1, 157, 900	49, 620, 300	540, 244, 583	1, 227, 500	1, 157, 900	49, 620, 300	540, 244, 583	1, 227, 500	1, 157, 900	49, 620, 300	540, 244, 583
1922	1, 202, 130	1, 169, 100	50, 360, 850	590, 605, 433	1, 202, 130	1, 169, 100	50, 360, 850	590, 605, 433	1, 202, 130	1, 169, 100	50, 360, 850	590, 605, 433
1923	1, 213, 700	1, 179, 870	65, 046, 300	655, 651, 733	1, 213, 700	1, 179, 870	65, 046, 300	655, 651, 733	1, 213, 700	1, 179, 870	65, 046, 300	655, 651, 733
1924	1, 290, 890	1, 216, 610	67, 608, 880	723, 260, 613	1, 290, 890	1, 216, 610	67, 608, 880	723, 260, 613	1, 290, 890	1, 216, 610	67, 608, 880	723, 260, 613
1925	1, 320, 300	1, 242, 750	77, 608, 880	797, 856, 481	1, 320, 300	1, 242, 750	77, 608, 880	797, 856, 481	1, 320, 300	1, 242, 750	77, 608, 880	797, 856, 481
1926	1, 411, 020	1, 328, 810	70, 368, 020	868, 641, 931	1, 411, 020	1, 328, 810	70, 368, 020	868, 641, 931	1, 411, 020	1, 328, 810	70, 368, 020	868, 641, 931
1927	1, 378, 990	1, 326, 810	70, 985, 450	941, 222, 963	1, 378, 990	1, 326, 810	70, 985, 450	941, 222, 963	1, 378, 990	1, 326, 810	70, 985, 450	941, 222, 963
1928	1, 442, 080	1, 385, 560	80, 238, 500	1, 021, 461, 463	1, 442, 080	1, 385, 560	80, 238, 500	1, 021, 461, 463	1, 442, 080	1, 385, 560	80, 238, 500	1, 021, 461, 463
1929	1, 583, 900	1, 467, 097	87, 559, 670	1, 109, 021, 133	1, 583, 900	1, 467, 097	87, 559, 670	1, 109, 021, 133	1, 583, 900	1, 467, 097	87, 559, 670	1, 109, 021, 133
1930	1, 404, 810	1, 467, 097	64, 418, 940	1, 173, 440, 073	1, 404, 810	1, 467, 097	64, 418, 940	1, 173, 440, 073	1, 404, 810	1, 467, 097	64, 418, 940	1, 173, 440, 073
1931	1, 522, 718	1, 462, 565	40, 121, 089	1, 213, 561, 162	1, 522, 718	1, 462, 565	40, 121, 089	1, 213, 561, 162	1, 522, 718	1, 462, 565	40, 121, 089	1, 213, 561, 162
1932	1, 555, 144	1, 506, 320	31, 163, 752	1, 244, 724, 914	1, 555, 144	1, 506, 320	31, 163, 752	1, 244, 724, 914	1, 555, 144	1, 506, 320	31, 163, 752	1, 244, 724, 914
1933	1, 389, 770	1, 529, 903	48, 138, 576	1, 292, 863, 490	1, 389, 770	1, 529, 903	48, 138, 576	1, 292, 863, 490	1, 389, 770	1, 529, 903	48, 138, 576	1, 292, 863, 490
1934	1, 552, 124	1, 464, 405	59, 628, 327	1, 352, 491, 817	1, 552, 124	1, 464, 405	59, 628, 327	1, 352, 491, 817	1, 552, 124	1, 464, 405	59, 628, 327	1, 352, 491, 817
1935	1, 640, 936	1, 604, 166	63, 601, 663	1, 416, 093, 480	1, 640, 936	1, 604, 166	63, 601, 663	1, 416, 093, 480	1, 640, 936	1, 604, 166	63, 601, 663	1, 416, 093, 480
1936	1, 702, 192	1, 629, 174	78, 902, 818	1, 495, 000, 298	1, 702, 192	1, 629, 174	78, 902, 818	1, 495, 000, 298	1, 702, 192	1, 629, 174	78, 902, 818	1, 495, 000, 298
1937	1, 725, 463	1, 700, 969	87, 859, 804	1, 582, 860, 102	1, 725, 463	1, 700, 969	87, 859, 804	1, 582, 860, 102	1, 725, 463	1, 700, 969	87, 859, 804	1, 582, 860, 102
1938	1, 777, 584	1, 764, 363	67, 859, 804	1, 650, 719, 906	1, 777, 584	1, 764, 363	67, 859, 804	1, 650, 719, 906	1, 777, 584	1, 764, 363	67, 859, 804	1, 650, 719, 906
1939	1, 922, 868	1, 903, 269	73, 769, 654	1, 724, 489, 560	1, 922, 868	1, 903, 269	73, 769, 654	1, 724, 489, 560	1, 922, 868	1, 903, 269	73, 769, 654	1, 724, 489, 560

¹ Includes projects constructed by the United States and those for which supplemental water is furnished from storage works built by United States.² Estimated.

RECLAMATION TABLE 1.—Consolidated Financial Statement, June 30, 1940

DEBIT SIDE

Construction account, primary projects:

Cost of irrigation works:

Original construction.....	\$456,241,095.28
Supplemental construction.....	12,892,718.81
Value of works taken over.....	2,485,731.93

Total construction cost..... 471,619,546.02

Operation and maintenance prior to public notice, net.. \$3,172,455.85

Operation and maintenance deficits and arrearages funded with construction..... 6,009,098.65

Penalties on water-right charges funded with construction..... 3,248,498.84

12,430,053.34

Total..... 484,049,599.36

Less income items:

Construction revenues..... \$8,340,233.18

Contributed funds..... 2,101,258.83

Nonreimbursable appropriation, Rio Grande Dam.. 1,000,000.00

11,441,492.01

472,608,107.35

Less abandoned works, nonreimbursable cost and charge-offs..... 17,133,000.70

Balance payable.....

\$455,475,106.65

Palo Verde flood protection, cost of construction and repairs..... 48,806.46

Secondary projects and general investigations:

Cost of surveys and investigations..... \$5,652,578.32

Less contributed funds..... 650,338.41

5,002,239.91

General offices expense undistributed..... 194,871.98

Plant and equipment..... 2,189,651.84

Materials and supplies..... 5,347,428.24

Accounts receivable:

Current accounts..... 2,146,589.20

Deferred accounts..... 248,501,787.29

250,648,376.49

Undistributed clearing cost accounts..... 3,114,520.16

Unadjusted debits, disbursement vouchers in transit..... 17,862.50

Cash:

Balance on hand:

Reclamation fund..... 16,353,798.92

General fund..... 52,973,267.65

National Industrial Recovery and P. W. A. allotments..... 4,414,016.42

Emergency Relief allotments..... 354,499.09

Contributed funds..... 143,175.63

74,238,757.71

In special deposit account..... 27,289.32

74,266,047.03

Total debits..... 796,279,186.26

¹ Contra.

RECLAMATION TABLE 1.—Consolidated Financial Statement, June 30, 1940—Con.

CREDIT SIDE

Security for repayment of cost of irrigation works: Contracted construction repayments...	\$302,687,770.10	
Current accounts payable.....	9,102,641.07	
Deferred and contingent obligations.....	1,209,753.10	
Reserves and undistributed profits.....	11,181,002.93	
Operation and maintenance results, surplus.....	902,688.38	
Unadjusted credits, collection vouchers in transit.....	119,828.04	
Government aid for reclamation of arid lands:		
Reclamation fund.....	\$205,443,013.72	
Advances to reclamation fund:		
Treasury loan (act of June 25, 1910).....	\$20,000,000.00	
Less amount repaid.....	20,000,000.00	
Treasury loan (act of Mar. 4, 1931).....	5,000,000.00	
Less amount repaid.....	5,000,000.00	
National Industrial Recovery and Public Works Administration allotments.....	75,049,573.68	
Emergency Relief allotments.....	46,767,012.28	
Work Projects Administration direct expenditures.....	269,840.72	
General fund:		
Central Valley project.....	67,000,000.00	
Grand Coulee Dam project.....	88,750,000.00	
Other appropriations.....	11,896,404.17	
	495,175,844.57	
Less nonreimbursable appropriations, Rio Grande Dam.....	1,000,000.00	
	494,175,844.57	
Less impairment of funds:		
Abandoned works.....	2,828,984.62	
Nonreimbursable construction cost.....	382,097.31	
Operation and maintenance cost uncollectible.....	969,943.39	
Washington office cost since December 5, 1924.....	2,839,326.57	
Attendance at meetings.....	1,815.90	
Giving information to settlers.....	11,238.17	
Prepaid civil-service retirement fund.....	2,340.33	
Charge-offs (act of May 25, 1926).....	14,699,308.24	
Operation and maintenance administration.....	53,521.69	
Administrative costs, Denver and field legal offices.....	910,401.36	
Returned to Treasury, miscellaneous receipts.....	153.22	
Impounded funds, economy acts.....	261,552.05	
	22,960,685.85	
	471,215,158.72	
Total credits.....	796,279,186.26	

¹ Contra.

RECLAMATION TABLE 2.—Consolidated Statement by Projects of Construction Cost of Irrigation Works, Other Items Reimbursable With Construction, and Amounts Repayable

State and project	Construction cost		Operation and maintenance before public notice (net)		Operation and maintenance deficits and rearrangements and penalties		Construction revenues, contributed funds, and nonreimbursable appropriation (contribution)		Abandoned works, non-reimbursable cost and authorized charge-offs	Total repayable	
	Fiscal year 1940	To June 30, 1940	Fiscal year 1940	To June 30, 1940	Fiscal year 1940	To June 30, 1940	Fiscal year 1940	To June 30, 1940		Fiscal year 1940	To June 30, 1940
Arizona:											
Gila	\$309,041.39	\$4,561,452.75								\$309,041.39	\$4,561,452.75
Salt River	263,809.23	20,225,003.12								263,809.23	18,609,822.52
Yuma Auxiliary		902,060.50								1,468.39	901,097.00
Arizona-California:											
Yuma		9,373,406.10								114,846.58	9,708,293.48
California:											
Central Valley	24,002,310.29	41,626,645.75	\$1,870,000	18,700,000						23,898,360.47	41,522,695.93
Orland		2,448,669.71		111,432.99						1,551.85	2,469,718.89
Colorado:											
Colorado - Big Thompson	2,292,873.88	4,695,268.39								2,274,782.12	4,676,698.21
Fruitgrowers Reservoir	44,895.20	197,193.67								42,395.20	194,693.67
Grand Valley	28.62	5,020,641.35								28.62	4,081,724.56
Paonia	16,941.98	16,941.98								16,941.98	16,941.98
Pine River	1,205,129.11	2,468,724.33								1,204,649.11	2,467,724.33
Uncompahgre	180,344.52	8,763,027.14								180,344.52	7,984,778.00
Idaho:											
Boise	30,886.20	16,830,666.45								136,078.23	17,139,691.38
Boise-Payette	648,868.44	3,518,904.84	8.83	11,479.72						648,877.27	3,517,425.12
King Hill		1,905,918.80									
Minidoka	73,378.52	19,303,723.46	1175.95	317,845.79						72,802.57	18,218,975.43
Upper Snake River	225,570.02	2,730,368.62								231,538.50	2,755,113.12
Kansas: Garden City		342,963.08									
Montana:											
Bitter Root		947,641.05									
Buffalo Rapids	11,107,369.17	(2)								11,107,369.17	
Chain Lakes	489,484.58	1,719,289.83								485,084.58	1,674,889.83
Frenchtown	6,361.72	270,521.37	20.66	5,496.26						6,382.38	276,017.63
Huntley		1,559,590.46									
Milk River	1,120.30	6,926,011.36	161.03	436,935.77						1,059.27	1,862,804.92
Sun River	282,987.25	9,190,481.01	144.71	132,606.67	31.23					282,973.77	9,289,203.34
Montana-North Dakota: Lower Yellowstone		3,685,433.14	1765.00	17,681.72						1326.52	4,110,574.50
Nebraska: Wyoming: North Platte	155,572.96	19,538,673.94								12,790.49	20,963,362.71

[illegible]

Contra.

* Transferred to water conservation and utility projects

WATER CONSERVATION AND UTILITY PROJECTS

State and project	Construction cost		Operation and maintenance during construction		Construction revenues, contributed funds, and nonreimbursable appropriation (contra)		Construction revenues (contra)		Abandoned works, non-reimbursable cost and authorized charge-off	Net	
	Fiscal year 1940	To June 30, 1940	Fiscal year 1940	To June 30, 1940	Fiscal year 1940	To June 30, 1940	Fiscal year 1940	To June 30, 1940		Fiscal year 1940	To June 30, 1940
Montana:											
Buffalo Rapids, First Division.....	\$1,509,826.73	\$1,509,826.73	\$583.33	\$583.33			\$215.00	\$215.00		\$1,510,195.06	\$1,510,195.06
Buffalo Rapids, Second Division.....	26,281.38	26,281.38								26,281.38	26,281.38
Nebraska: Mirage Flats.....	4,877.98	4,877.98								4,877.98	4,877.98
North Dakota: Buford-Trenton.....	86,305.87	86,305.87								86,305.87	86,305.87
South Dakota: Rapid Valley.....	21,880.15	21,880.15								21,880.15	21,880.15
Total.....	1,649,172.11	1,649,172.11	583.33	583.33			215.00	215.00		1,649,540.44	1,649,540.44

³ Major portion of expenditures made from emergency relief funds.

BOULDER CANYON PROJECT
Boulder Dam, Power Plant, and Appurtenant Works
RECLAMATION TABLE 3.—Financial Statement June 30, 1940
ASSETS AND OTHER DEBITS

I. INVESTMENTS

Fixed capital under construction.....	\$120, 178, 943. 19
Other physical properties.....	1, 478, 419. 10
Investigations—Colorado River Basin.....	232, 205. 65
Investigations—Parker-Gila project.....	75, 350. 64
Other capital expenditures—Interest during construction.....	20, 409, 749. 43
Earnings and expenses during construction.....	¹ 571, 794. 20
Total investments (schedule 2).....	\$141, 802, 873. 81

II. CURRENT AND ACCRUED ASSETS

Treasury cash:	
For advance to Colorado River Dam fund.....	\$4, 450, 000. 00
Colorado River Dam fund.....	1, 099, 272. 94
N. I. R. A.—Parker-Gila project.....	6, 096. 00
Collections in transit.....	414, 968. 37
Total Treasury cash (schedule 1).....	5, 970, 337. 31
Disbursing officer's cash (schedule 1).....	416, 744. 51
Accounts receivable.....	81, 147. 74
Total current and accrued assets.....	6, 468, 229. 56

IV. DEFERRED AND UNADJUSTED DEBITS

Clearing and apportionment accounts.....	¹ \$182, 538. 53
Field cost adjustments.....	860. 11
Jobbing accounts.....	27, 107. 38
Prepayments.....	
Unadjusted debits.....	¹ 10, 592. 74
Total deferred and unadjusted debits.....	¹ 165, 163. 78
Total assets and other debits.....	148, 105, 939. 59

LIABILITIES AND OTHER CREDITS**X. CAPITAL AND LONG-TERM LIABILITY**

Long-term liability—U. S. Treasury authorized appropriation.....	\$126, 500, 000. 00
Less: Authorized but not appropriated.....	190, 000. 00
Total long-term liability:	
Appropriated but not advanced.....	4, 450, 000. 00
Appropriated and advanced.....	121, 860, 000. 00
Less: Impounds, Legislative Economy Act.....	¹ 137, 653. 66
N. I. R. A. allotment Parker-Gila project.....	93, 000. 00
Interest on advances to Colorado River Dam fund.....	20, 284, 117. 85
Judgments—Court of Claims.....	37, 766. 29
	146, 687, 230. 48

XI. CURRENT AND ACCRUED LIABILITIES

Audited accounts payable:	
Contractors,—current.....	7, 592. 85
Contractors earnings—hold-back.....	1, 689. 50
Labor.....	58, 997. 26
Purchases.....	6, 905. 04
Freight and express.....	49, 977. 79
Passenger fares.....	708. 16
Rights-of-way.....	
Miscellaneous.....	11, 894. 84
Refunds.....	
Total audited accounts payable.....	137, 765. 44
Accrued interest.....	
Total current and accrued liabilities.....	137, 765. 44

¹ Contra.

XIII. DEFERRED AND UNADJUSTED CREDITS

Unadjusted credits..... 4, 472. 07

XV. RESERVES

Reserve for amortization of long-term debt and payment to States..... 1, 276, 471. 6

Total liabilities and other credits..... 148, 105, 939. 5

BOULDER CANYON PROJECT

Boulder Dam, Power Plant, and Appurtenant Works

RECLAMATION TABLE 4.—Appropriations and Cash Statement June 30, 1940

	Regular appro- piation	N. I. R. A. al- lotment	Total	N. I. R. A. Parker-Gila project
TREASURY CASH				
Appropriations and allotments.....	\$88, 310, 000. 00	\$38, 000, 000. 00	\$126, 310, 000. 00	\$93, 000. 00
Advances to Colorado River Dam fund.....	83, 860, 000. 00	38, 000, 000. 00	121, 860, 000. 00	
Balance not advanced.....	4, 450, 000. 00		4, 450, 000. 00	
Colorado River Dam fund:				
Advanced from appropriation to fund.....	83, 860, 000. 00	38, 000, 000. 00	121, 860, 000. 00	
Collections deposited in fund.....	13, 020, 732. 72	23, 403. 44	13, 044, 136. 16	5, 182. 67
Total advances and collections.....	96, 880, 732. 72	38, 023, 403. 44	134, 904, 136. 16	98, 182. 67
Transfer to miscellaneous receipts, Treas- ury.....	10, 200, 000. 00		10, 200, 000. 00	
Disbursements by General Accounting Office.....	4, 985, 631. 93	54, 723. 63	5, 040, 355. 56	
Advance to disbursing officers.....	80, 596, 427. 98	37, 968, 079. 68	118, 564, 507. 66	92, 086. 67
Total withdrawals.....	95, 782, 059. 91	38, 022, 803. 31	133, 804, 863. 22	92, 086. 67
Balance.....	1, 098, 672. 81	600. 13	1, 099, 272. 94	6, 096. 00
Repay collections in transit.....	480. 24		480. 24	501. 00
Miscellaneous collections in transit.....	413, 987. 13		413, 987. 13	
Total Treasury cash (G. L. 121).....	1, 513, 140. 18	600. 13	1, 513, 740. 31	6, 597. 00
DISBURSING OFFICERS' CASH				
Advances and appropriation transfer ad- justments.....	80, 606, 661. 87	37, 974, 709. 56	118, 581, 371. 43	92, 086. 67
Disbursements by disbursing officers.....	80, 205, 625. 98	37, 974, 481. 10	118, 180, 107. 18	87, 872. 29
Disbursing officers checking balance.....	401, 035. 89	228. 46	401, 264. 35	4, 214. 38
Collections by disbursing officers.....	13, 448, 747. 64	29, 416. 43	13, 478, 179. 84	5, 683. 57
Collections deposited and appropriation transfer.....	13, 437, 481. 86	29, 416. 43	13, 466, 914. 06	5, 683. 57
Collections not deposited.....	11, 265. 78		11, 265. 78	
Total disbursing officers' cash (G. L. 122).....	412, 301. 67	228. 46	412, 530. 13	4, 214. 38

ALL-AMERICAN CANAL

RECLAMATION TABLE 5.—Financial Statement June 30, 1940

ASSETS AND OTHER DEBITS

I. INVESTMENTS

Fixed capital under construction..... \$28, 707, 177. 42

II. CURRENT AND ACCRUED ASSETS

Treasury cash:

For advances to Colorado River Dam fund.....	\$2, 475, 000. 00	
Colorado River Dam fund.....	157, 794. 35	
P. W. A., N. I. R. A., and E. R. A. allotments.....	21, 089. 89	
Contributions—Imperial Irrigation District.....	22, 797. 59	
Collections in transit.....	2, 173. 50	
Total Treasury cash.....	2, 678, 855. 33	
Disbursing officer's cash.....	739, 011. 02	
Accounts receivable.....	58, 768. 92	
Total current and accrued assets.....		3, 476, 635. 27

IV. DEFERRED AND UNADJUSTED DEBITS

Clearing and apportionment accounts.....	¹ \$12, 409. 99	
Field cost adjustment.....	14, 134. 07	
Unadjusted debits.....	2, 456. 11	
Total deferred and unadjusted debits.....		4, 180. 19
Total assets and other debits.....		32, 187, 992. 88

¹ Contra.

LIABILITIES AND OTHER CREDITS

X. CAPITAL AND LONG-TERM LIABILITY

Long-term liability—U. S. Treasury authorized appropriation.....	\$38, 500, 000. 00	
Less: Authorized but not appropriated.....	6, 600, 000. 00	
Total long-term liability:		
Appropriated but not advanced.....	2, 475, 000. 00	
Appropriated and advanced.....	29, 425, 000. 00	
		31, 900, 000. 00

XI. CURRENT AND ACCRUED LIABILITIES

Audited accounts payable:		
Contractors' earnings—current.....	\$93, 921. 94	
Contractors' earnings—hold-back.....	74, 429. 53	
Labor.....	13, 540. 85	
Purchases.....	11, 136. 86	
Freight and express.....	10, 762. 43	
Passenger fares.....	121. 21	
Rights-of-way.....		
Miscellaneous.....	475. 71	
Refunds.....	25. 00	
Total current and accrued liabilities.....		204, 413. 53

XII. OTHER CREDITS

Contributed funds—Imperial and Coachella Irrigation Districts.....	80, 000. 00
--	-------------

XIII. DEFERRED AND UNADJUSTED CREDITS

Unadjusted credits.....	\$1, 411. 80	
Unadjusted credits, Yuma project.....	97. 12	
Total deferred unadjusted credits.....		1, 508. 92

XV. APPROPRIATED SURPLUS

Appropriated surplus not specifically invested.....	2, 070. 43	
Total liabilities and other credits.....		32, 187, 992. 88

ALL-AMERICAN CANAL
RECLAMATION TABLE 6.—Appropriation and Cash Statement June 30, 1940

	N. I. R. A. allotment	P. W. A. allotment	Emergency relief allotment	1938 P. W. A. allotments	Regular appropriation	Contributed funds
TREASURY CASH						
Appropriations						
Advances to Colorado River Dam fund					\$12,000,000.00 9,525,000.00	
Balance not advanced					2,475,000.00	
Colorado River Dam fund:						
Advances to Colorado River Dam fund, allotments and contributed funds	\$6,000,000.00	\$2,900,000.00	\$10,000,000.00	\$1,000,000.00	9,525,000.00	\$80,000.00
Collections deposited	18,898.96	3,090.60	23,335.50		359,421.08	
Total advances, allotments, etc.	6,018,898.96	2,903,090.60	10,023,335.50	1,000,000.00	9,884,421.08	80,000.00
Disbursements by General Accounting Office	61,164.24	16.17	551.97		4,626.73	
Advances to disbursing officers and disbursements	5,953,703.36	2,902,997.18	10,020,000.00	985,802.25	9,722,000.00	57,202.41
Total withdrawals	6,014,867.60	2,903,013.35	10,020,551.97	985,802.25	9,726,626.73	57,202.41
Balance						
Repay collections in transit	4,031.36	77.25	2,783.53	14,197.75	157,794.35	22,797.59
Miscellaneous collections in transit					2,097.41	
					76.09	
Total Treasury cash	4,031.36	77.25	2,783.53	14,197.75	2,634,967.85	22,797.59
DISBURSING OFFICERS' CASH						
Advances and appropriation transfer adjustments						
Disbursements by disbursing officers	5,953,878.34	2,902,997.18	10,020,000.00		9,722,000.00	
	5,890,363.06	2,887,492.61	9,906,169.35		9,175,839.48	
Disbursing officers' check balance	63,515.28	15,504.57	113,890.65		546,160.52	
Collections by disbursing officers	19,003.19	3,090.60	23,335.50		361,594.58	
Collections deposited and appropriation transfer	19,003.19	3,090.60	23,335.50		361,594.58	
Collections not deposited						
Disbursing officers' cash balance	63,515.28	15,504.57	113,890.65		546,160.52	

BONNEVILLE POWER ADMINISTRATION

Paul J. Raver, Administrator

THE force of the Federal Government's long-range program for the development of the multiple uses of the Columbia River is already being felt in the Pacific Northwest.

Events of the last year indicate that the construction of such multipurpose projects as Bonneville dam, 40 miles east of Portland, Oreg., and Grand Coulee dam, farther up the Columbia River in Central Washington, is providing the foundation for a new and more abundant economy in the region.

Not only do these projects provide for irrigation and flood control and for new avenues of inland transportation, but also create a great and wholly new source of electric power essential to the full development of the territory.

Because power is not the sole product of the large dams, but merely one of many products of large scale projects such as Bonneville, it is possible to market the energy at the lowest wholesale rate in America—\$17.50 a kilowatt year at any point on the Government's transmission system. These low rates have already been reflected in a general lowering of retail rates charged consumers of systems using Federally generated Columbia River power, in a general rise in domestic and commercial electric usage, and in the establishment of wholly new industries in the area.

NEW POWER PLAYS DEFENSE ROLE

In addition to these increasing benefits to the region, where in the past the economy has been based upon the lumber industry and upon agriculture, it is now recognized that these large projects will and already are playing a vital role in providing for the defense of the Nation. Nowhere in the United States today is there so great a source of dependable electric power. Power is essential to many of the industries now engaged in the manufacture of defense materials, and as expansion of these industries takes place to meet the growing defense demands of the Federal Government, such industries are turning to the Pacific Northwest.

As a result of this emergency demand, as well as a rapidly expanding normal market, which studies indicate will require the total output

of both dams by 1950, it has become apparent in recent months that generating equipment should be installed as rapidly as possible at both Bonneville and Grand Coulee. Already the Bonneville Power Administration is contracting ahead of generator installation, and anticipates in the near future calling upon Grand Coulee for a large block of power to meet industrial needs.

Two 43,200-kilowatt generators have been installed and are in operation at Bonneville Dam. Two additional 54,000-kilowatt generators are being installed and are scheduled for service in January 1941. Two others of the same size are scheduled for installation by January 1942 and recommendations have gone forward for the installation of the four remaining 54,000-kilowatt generators which will bring the Bonneville plant to its full capacity of 518,400 kilowatts.

Installation of the first of eighteen 108,000-kilowatt generators in the Grand Coulee power house is scheduled for July 1941 with No. 2 scheduled for September 1941 and No. 3 for January 1942.

MANY NEW INDUSTRIES POSSIBLE

In a period when the country is faced with the problem of rearming, establishment of new industries in virgin territory close to new supplies of power becomes significant. These industries are directly and indirectly related to war requirements. Among industries which have entered preliminary discussion with the Bonneville Power Administration are those which will produce aluminum, ferro chrome, magnesium, chlorates and hydrates, and alloy steel. All of these products are used in the defense industries of aircraft, munitions, ordnance, and shipbuilding. All fall in the fields of electro-chemistry and electro-metallurgy, fields that ordinarily would be expected to develop in the Pacific Northwest because of the importance to them of cheap power and the availability of materials.

In appraising the possible contributions of the Northwest to the national defense program as the result of the construction of Bonneville and Grand Coulee Dams, an important fact should be noted about the present location of the war industries of the Nation. Most of them lie in the Northeastern States, east of the Mississippi River, occupying 13 percent of the land area of the country. In contrast, the 11 Western States, covering 40 percent of the land area, are not equipped with industries to provide adequately for the defense of the Pacific Coast and Pacific possessions, nor with industries to supplement, when necessary, the production of eastern plants for the defense of the Atlantic outposts.

These Western States lack munitions and ordnance plants. They have only some shipbuilding and aircraft manufacturing facilities; but even for these industries the west draws upon the east for many basic materials and parts that could be made closer to the western plants.

These circumstances do not contribute to the speedy and most effective defense of the United States and its possessions. The products of western mines, vital to the war industries in the East—copper, lead, zinc, mercury, tungsten, molybdenum, etc.—have to move east 2,000 miles for processing and fabrication. Most of this has to return 3,000 to 6,000 miles in the form of materials and supplies for the defense outposts of the Pacific Coast, Alaska, and Hawaii. Some of these movements could be eliminated. Thus, copper, and zinc could be made into brass for munitions close to the western mines. Pig aluminum, now being made at the new plant of the Aluminum Co. of America in the State of Washington, could be converted into sheets and extruded parts in western mills to supply the large aircraft plants of the Pacific Northwest.

All this is made possible by the enormous reservoirs of low cost power created by the Federal Government on the Columbia River that await the command of the Nation to serve whatever uses may be dictated by the interests of national defense.

MARKETING PROCEEDS RAPIDLY

The marketing of Columbia River power has proceeded at a rapid rate and present prospects are that there will be an even greater acceleration of sales during the next year. On June 30, 1940, the Bonneville Power Administration, which has since been authorized by the President to market Grand Coulee as well as Bonneville power, had executed firm contracts totaling 101,350 kilowatts, with deliveries scheduled on the basis of generator installation and line completion. By September 1940 contracts for an additional 5,500 kilowatts had been executed and additional contracts submitted totaling 10,800 kilowatts. Recent deliveries, including sales of dump energy and interchange of energy, have ranged up as high as 91,000 kilowatts, or more than the rated capacity of the two generating units now in operation at the Bonneville powerhouse. On the basis of contracts negotiated and other prospective sales, revenues of the Bonneville Power Administration will total about \$1,880,000 for the fiscal year 1941 and \$4,000,000 for the fiscal year 1942.

Prime power contracts executed as of September 14, 1940

Date		Name	Kilowatts	Energized
Contract	Commitment			
Aug. 2, 1939	Jan. 3, 1940	Public utility districts:		
Oct. 5, 1939	Oct. 1, 1940	Skamania County.....	200	Jan. 3, 1940
Nov. 10, 1939	Oct. 1, 1940	Pacific County.....	1, 500	
Dec. 5, 1939	Oct. 1, 1940	Wahkiakum County.....	400	
May 15, 1940	Oct. 1, 1941	Klickitat County.....	1, 500	
		Tillamook County.....	2, 000	
			5, 600	
Feb. 14, 1939 ¹	July 25, 1938	Municipalities:		
Nov. 7, 1939	Nov. 28, 1939	Cascade Locks.....	200	July 25, 1938
Dec. 22, 1939	Feb. 1, 1940	Forest Grove.....	750	Nov. 28, 1939
Jan. 4, 1940	Oct. 1, 1940	Canby.....	300	Feb. 1, 1940
Jan. 13, 1940	Oct. 1, 1940	Monmouth.....	400	
Feb. 13, 1940	Oct. 1, 1940	McMinnville ²	1, 000	
Feb. 23, 1940	Oct. 1, 1940	Centralia ³	300	
May 6, 1940	Jan. 1, 1941	Tacoma.....	(⁴)	
Aug. 1, 1940	Apr. 1, 1941	Seattle.....	(⁴)	
Aug. 20, 1940	Oct. 1, 1940	Ellensburg.....	2, 000	
		Eugene ³	1, 500	
			6, 450	
June 27, 1940	Sept. 15, 1940	R. E. A. cooperatives: Oregon-Lincoln ⁴	300	
Dec. 1, 1939	Dec. 1, 1939	Private utilities:		
June 4, 1940	Mar. 15, 1941	Portland General Electric Co.....	20, 000	Dec. 1, 1939
July 27, 1940	Aug. 4, 1940	Pacific Power & Light Co., Astoria ²	1, 500	
		Northwestern Electric Co. and Wash- ton Water Power Co.....	(⁴)	Aug. 4, 1940
			21, 500	
Dec. 23, 1939	Sept. 1, 1940	Industries:		
Feb. 20, 1940		Aluminum Co. of America.....	32, 500	Aug. 31, 1940
Apr. 16, 1940	Jan. 1, 1941	Sierra Iron Co.....	6, 000	
July 13, 1940	Jan. 1, 1941	Aluminum Co. of America.....	32, 500	
		Pacific Carbide & Alloys Co.....	2, 000	
			73, 000	
		Total.....	106, 850	
Jan. 11, 1940	Nov. 28, 1939	Transfer agreements:		
Jan. 11, 1940	Feb. 1, 1940	Portland General Electric Co., Forest Grove.....		
July 16, 1940	Sept. 30, 1940	Portland General Electric Co., Canby.....		
		Northwestern Electric Co.-Pacific Car- bide & Alloys Co.....		

¹ Supply effective Nov. 1, 1939.² Contract also provides for interchange of power.³ Contract calls for additional sales of dump power and provides for interchange of power.⁴ Interchange.

In addition contract negotiations are being carried on with applicants of all types—public and private agencies, cooperatives, and industries—which have formally requested more than a half million kilowatts. Congress has provided in the Bonneville Act that 50 per cent of installed capacity of Bonneville dam be reserved until 1942 for public bodies and cooperatives and that preference be given those groups thereafter. But many of these applicants are not in a position to take power immediately. This is especially true of public utility districts which must acquire distribution systems before going into the power business. These districts are currently negotiating with private utility companies to purchase the necessary facilities. When this last obstacle has been overcome, the large public market for Columbia River power which Congress visioned will come into existence.

GRID CONSTRUCTION SPEEDED

In order to meet the expanding market for Columbia River power, and in order to carry out the mandate of Congress that Government power shall be carried to the markets of the Pacific Northwest over Government lines at the low uniform wholesale rate, it has been necessary to carry on a high-speed transmission construction program. This program involves construction of a high-voltage grid system linking Grand Coulee and Bonneville Dams with the principal hydroelectric plants of the territory. The magnitude of the program required to keep construction abreast with sales has resulted in simultaneous construction of lines on many fronts.

Because of this rapid development of the construction program it was necessary to increase the Bonneville Power Administration personnel during the year. On June 30, 1940, 2,421 persons were employed. Of these, 1,203 were engaged as hourly laborers and skilled craftsmen in construction work, such as clearing right-of-ways, location and construction of power lines, substations, and related equipment. All employees were secured in accordance with Civil Service rules and regulations and in accordance with section 10 of the Bonneville Act, with special emphasis being placed on selection of employees from the Pacific Northwest. An analysis of the staff shows 92.6 percent residents of Oregon and Washington.

SIX HUNDRED MILES OF LINE COMPLETE

To date a total of 600 circuit miles of transmission line has been completed, 449 miles is under construction, and 189 miles, scheduled for completion early in 1941, is ready for contract.

The Bonneville Power Administration's first high tension transmission lines, two 40-mile 230,000-volt circuits between the Bonneville dam and Vancouver, Wash., were completed December 1, 1939. A few hours later power was being delivered to the Portland metropolitan area. On August 6, 1940, a 235-mile circuit built to connect the generators of Bonneville and Grand Coulee dams, was completed and energized, setting a new record for high-speed line construction on the project. Surveys for this line began August 25, 1938, with actual construction starting a year later.

Meanwhile, construction of other segments of the main transmission system was proceeding at high speed, and by September 1, 1940, the following circuits had been installed:

Vancouver, Wash., to Kelso, Wash., 41.2 miles; Kelso, Wash., to Chehalis, Wash., 30.5 miles; Chehalis, Wash., to Raymond, Wash., 45.5 miles; Condit, Wash., to Glenwood, Wash., 22.5 miles; Vancouver, Wash., to Eugene, Oreg., 127.7 miles; Salem, Oreg., to Mc-

Minnville, Oreg., 21.7 miles; Vancouver, Wash., to Aluminum Co. of America plant, 4.2 miles.

Lines under construction on September 1, 1940, included: Covington, Wash., to Tacoma, Wash., 13 miles; Salem, Oreg., to Monmouth, Oreg., 13 miles; Vernita, Wash., to Hanford, Wash., 19 miles; Hanford, Wash., to Pasco, Wash., 35 miles; Pasco, Wash., to Walla Walla, Wash., 32 miles; Walla Walla, Wash., to Pendleton, Oreg., 44 miles; Walla Walla, Wash., to Lewiston, Idaho, 85 miles; Lewiston, Idaho, to Colfax, Wash., 42 miles; Vernita, Wash., to Ellensburg, Wash., via Yakima, Wash., 69 miles; Bonneville Dam to Oregon City, Oreg., 51 miles; Oregon City, Oreg., to Salem, Oreg., 36 miles.

Bids also had been invited for construction of the following: Portland, Oreg., to Astoria, Oreg., 82.2 miles; Bonneville Dam to Hood River, Oreg., 22 miles; Hood River, Oreg., to The Dalles, Oreg., 16.1 miles; Chehalis, Wash., to Covington, Wash., on the outskirts of Seattle, Wash., 69.4 miles.

Other lines are contemplated in the near future from Grand Coulee Dam to Covington, Wash., completing the main transmission loop linking the two Federal power plants with major generating plants of the Puget Sound area of northwestern Washington; from Grand Coulee Dam to Spokane, Wash., and Colfax, Wash., completing the eastern Washington loop of the Federal transmission system; and from Pendleton, Oreg., to La Grande, Oreg.

SUBSTATION PROGRAM EXTENSIVE

In order to transform the power from the high voltages required to carry it over the transmission network to voltages suitable for delivery to distributing agencies it has been necessary to provide a number of substations of various types. The largest of these is located at Vancouver, Wash. Others are being built or are scheduled for construction at Covington, Wash., St. Johns, Oreg., Vernita, Wash., Salem, Oreg., Eugene, Oreg., McMinnville, Oreg., Raymond, Wash., Chehalis, Wash., North Bonneville, Wash., Hanford, Wash., Ellensburg, Wash., Astoria, Oreg., Walla Walla, Wash., Pendleton, Oreg., The Dalles, Oreg., Colfax, Wash., and Lewiston, Idaho.

Construction of the Federal transmission system into all sections of the Pacific Northwest is guaranteeing that Columbia River power will be available to all types of distributors and industries at the same low wholesale rate. Interconnection of the Federal system with other generating plants, both public and private, in addition assures the Pacific Northwest one of the most dependable supplies of power in the United States today, and the only remaining available source of hydro power in blocks of sufficient size to supply the expansion needs of major

industries. The magnitude of this power supply may be measured by the fact that Bonneville and Grand Coulee together will produce more than 2,400,000 kilowatts when all the generators are installed at both dams. This is over a million kilowatts more than will be available from all 10 dams of the Tennessee Valley Authority.

This, plus the abundant transportation facilities—deep water, barge and rail—and a wealth of mineral resources is encouraging the establishment of new industries in the area. The Aluminum Co. of America has contracted for 65,000 kilowatts of Bonneville power and has established its first western reduction operation at Vancouver, Wash. Two other new industries—calcium carbide and alloys, and iron—have also situated in the area to take advantage of Columbia River power and regional resources. Other industries, pressed for large blocks of power, are also negotiating with the Bonneville Power Administration.

GENERAL LAND OFFICE

Fred W. Johnson, *Commissioner*

FACILITATION of national defense and continuation of the program for conservation of the resources of the public domain were the primary objectives of the General Land Office during the year. Withdrawals of the public lands and requests for withdrawals in connection with the national-defense program embraced more than 7,000,000 acres. In addition, all outstanding aviation leases and beacon light permits contain provisions under which the Secretary of War may assume full control over the lands whenever the President deems them necessary for military purposes. A total of 41,369 acres have been withdrawn for air-navigation purposes.

The food supply of the Nation is vital to national defense, and a prime factor in the food supply is potash fertilizer. As a result of the war, shipments of this material from Europe and elsewhere have practically ceased. To meet the emergency, over 6,000 acres of land, comprising the greater part of the dry bed of ancient Searles Lake in California, have been leased. This area is rich in potash and the supply which will be available from this source, together with other potash produced in this country, largely from land leased from the Government in California and New Mexico, should be sufficient to meet all domestic needs.

For many sections of the United States, the township plats which depict the public land surveys, including general topography, supply the only map data available for military purposes. The rectangular system of surveys supplies a simple, concise, and definite identification of the boundaries of lands. During the year cadastral engineering activities resulted in surveys embracing 5,693,105 acres, in addition to engineering investigations and special projects. The surveys, figured on a mileage basis, cover a total of 35,549 miles.

Total cash receipts of the General Land Office from all sources amounted to \$7,057,942.16. This was more than three times the amount of the expenditures for operations and made the fourth consecutive year in which the receipts were in excess of \$7,000,000. The average receipts for the years 1933 to 1936, inclusive, amounted to \$4,472,358.48.

Conservation of the grazing resources on the vacant and unreserved public lands was furthered by regulated grazing under section 15 of



SETTING THE MONUMENT.

Final step in land-measurement operations by General Land Office surveyors in mapping the public domain, many portions of which now serve as areas for defense training as well as potential sources of strategic mineral supplies.

the Taylor Grazing Act. At the close of the year, grazing leases were outstanding on 7,411,986.77 acres, as against 5,830,743 acres outstanding at the close of the preceding year. Revenues from grazing leases during the fiscal year aggregated \$152,378.34, compared with \$137,365.13 during the preceding year.

The change from the system of issuing permits to prospect for oil and gas on the public domain, as authorized under the act of February 25, 1920 (41 Stat. 437), to the system of issuing leases under the amendatory act of August 21, 1935 (49 Stat. 674), has been practically completed. The change was designed to aid in the conservation of the oil and gas resources, prevent speculation, and secure more adequate returns to the United States from such resources. All outstanding oil and gas prospecting permits (except 126 in Alaska) terminated on December 31, 1939. With the exception of the Alaska permits, the right to prospect for oil and gas will be governed exclusively by the provisions of the amendatory act of August 21, 1935. This act granted to the holders of permits the right to exchange the permits for leases. Approximately 70 percent of these permits have been exchanged or are in process of being exchanged for leases.

Five oil and gas leases, embracing 1,370 acres in producing structures, were sold at public auction, in accordance with the policy of the Department to lease Government oil and gas lands which are subject to drainage as a result of drilling operations on nearby privately owned lands.

Management of the timber resources on the approximately 2,500,000 acres of revested Oregon and California railroad and reconveyed Coos Bay Wagon Road grant lands, in Oregon, was furthered through additional research, inventory, and classification and establishment of improved procedures for maintaining sustained yield cutting. Classification of the timberlands has progressed satisfactorily and preliminary estimates of present timber volume have been prepared for the entire forested area. The timber-producing capacity of the lands is being determined and intensive studies are under way in preparation for definite subdivision of the revested lands into master sustained-yield units.

The Branch of Planning, Use, and Protection made substantial progress on an inventory of the resources of the public domain, the mapping of the public domain lands, the classification of lands for which application for entry, selection, or location had been made, and the assembly and analysis of information concerning the economic resources of Alaska.

By direction of Congress the General Land Office compiled and prepared a new edition of the official wall map of the United States.

In order to secure increased benefits to the people from the use of the public lands, regulations were issued on August 7, 1939 (Circular No. 1459), providing for an annual rental charge of \$5 per mile or fraction thereof for rights-of-way over the public lands for telegraph and telephone lines, tramroads, oil and gas pipe lines, water pipe lines, ditches and canals, and a charge of \$5 per acre or fraction thereof, per annum, for the use of public lands for reservoirs, water plants, well sites, and other like structures, when such rights-of-way or uses are permitted or authorized by the acts of January 21, 1895 (28 Stat. 635), February 15, 1901 (31 Stat. 790), March 4, 1911 (36 Stat. 1253), and section 28 of the act of February 25, 1920, as amended by the act of August 21, 1935 (45 Stat. 1057).

Regulations were issued governing the utilization, primarily through lease, of small areas of the public domain outside certain national reservations for home-site, cabin, camp, health, convalescent, recreational, or business-site purposes, under the provisions of the five-acre tract act of June 1, 1938 (52 Stat. 609). The regulations authorize the filing of applications for such sites commencing August 9, 1940.

All applications received will be considered in the light of their effect upon the conservation of national resources and with respect to the effect they may have, if allowed, upon the welfare, not only of the applicants themselves but of the communities in which the lands applied for are situated.

Applications will not be allowed, for example, which would lead to private ownership or control of scenic attractions or water resources that should be kept open to public use. Settlement will not be permitted which would contribute toward making public charges of the settlers. Nor will isolated or scattered settlements be permitted which would impose heavy burdens upon the State or local governments for roads or schools, or for police, health, and fire protection or which would create eyesores along public highways.

During recent years there has been a marked change in the character of the work performed in the General Land Office. The former system of land disposals which required the issuance of patents has been superseded to a large extent by the present systems of leasing. Moreover, the areas remaining subject to the operation of the public-land laws have been greatly reduced. In these circumstances, it was found that the continuance of the office of recorder was not necessary and by authority of the Reorganization Act of April 3, 1939 (53 Stat. 561), and under the Third Reorganization Plan of the President which became effective June 30, 1940, the position of Recorder of the General Land Office was abolished. Acting under authority of that act and plan, the Secretary of the Interior on July 6, 1940, designated the Chief and Assistant Chief of the Patents Division of the General Land Office

to perform the duties formerly delegated to the recorder. These duties include the countersigning of land patents.

In order to meet a public demand for accurate information concerning the present and past activities of the General Land Office, a series of information bulletins has been prepared. These bulletins, copies of which are available free of charge, contain information on the following subjects:

- No. 1. Land grants to States and Territories for educational and other purposes.
- No. 2. Information relative to the disposal and leasing of public lands in Alaska.
- No. 3. Information relative to homestead laws and regulations.
- No. 4. Areas of the vacant public lands by States, counties, land districts, and grazing districts.
- No. 5. Information concerning land grants for roads, canals, river improvements, and railroads.

The regulations relating to the public lands, which were codified and printed as a part of volume 11, title 43, of the Code of Federal Regulations, have been reprinted as a separate volume, with an index and tables, and with a supplement which in effect brings the volume up to April 17, 1940. Copies are for sale by the Superintendent of Documents, Government Printing Office, at \$2 for title 43 and \$0.10 for the supplement.

In response to a continuing demand from county surveyors, landowners, and others, the pamphlet "Restoration of Lost or Obliterated Corners and Subdivision of Sections," has been revised and is for sale by the Superintendent of Documents at \$0.10 per copy.

There were decided on principles of equity and referred to the Board of Equitable Adjudication and confirmed 1,283 homestead entries of the public lands, 33 homestead entries of revested and reconveyed lands in Oregon, 8 homestead entries of ceded Indian lands, 18 reclamation homesteads, and 51 desert-land entries.

Sixteen civil suits were recommended to cancel leases for oil and gas, and coal, to cancel a patent obtained through fraud, to recover royalties due under coal permits, and to quiet title in the United States to oil and gas deposits. Eighteen cases were won and two were lost. Judgments and compromises have been received in the amount of \$39,765.65. Payments in the amount of \$22,865.26 were collected.

Cases of trespass on public lands included the following: Timber, 612; coal, 67; grazing, 17; turpentine, 1; unlawful inclosures, 11. The following sums were accepted in these cases in settlements: Timber, \$18,215.23; coal, \$2,770.54; grazing, \$4.

On June 30, 1940, there were 339 permanent employees of the General Land Office in Washington, 69 in the District Land Offices in addition to 23 Registers, 164 in the Cadastral Engineering Service, 18 in the Oregon and California Revested Lands Administration, 2 in the Range Development Service, and 6 in the Alaskan Fire Control Service.

THE PUBLIC LANDS

Surveyed and unsurveyed public lands.—The original public domain, exclusive of Alaska, aggregated 1,442,200,320 acres. As of June 30, 1940, 1,320,289,876 acres had been surveyed, leaving 121,910,444 acres unsurveyed.

In Alaska, embracing about 378,165,760 acres, the area surveyed as of June 30, 1940, was 2,245,862 acres, leaving 375,919,898 acres unsurveyed.

Vacant and unreserved public lands; grazing districts.—On June 30, 1940, the area of the vacant and unreserved public lands, exclusive of Alaska (unreserved except for the general orders of withdrawal issued in 1934 and 1935) aggregated 47,899,800 acres outside of grazing districts and the area of public lands within such districts and subject to grazing use was 138,639,718 acres. The area which was vacant and unreserved, in Alaska, on the date mentioned is estimated at 323,000,000 acres.

Areas under lease.—At the close of the fiscal year there were outstanding 5,103 mineral permits, leases, and licenses embracing 5,095,380 acres and 5,646 leases for grazing and purposes other than mineral, embracing a total of 8,395,471 acres.

Pending entries.—There were outstanding at the close of the year 9,703 entries embracing 2,373,542 acres, compared with 15,902 entries covering 5,098,829 acres, outstanding at the close of the preceding year. The decrease is due to the conservation program, which prevents the allowance of new entries, with certain exceptions, until after the classification of the lands; to the completion of many outstanding entries by the submission of satisfactory proofs, and to the cancellation of other entries for failure of the claimants to submit timely or satisfactory proofs.

Withdrawn and reserved areas.—The activities of the General Land Office extend in many ways to public lands which have been reserved or set aside for public purposes. These areas include public lands in national forests (subject to the operation of the mineral, national-forest homestead, and other public-land laws), public lands in grazing districts (subject to the operation of the mineral and other public-land laws as provided for by the Taylor Grazing Act), the revested Oregon and California railroad and reconveyed Coos Bay Wagon Road lands in Oregon, stock driveways, lands in which mineral and other rights have been reserved in patents heretofore issued, power-site withdrawals and classifications, lands withdrawn under the act of June 25, 1910, reclamation projects and former Indian lands. The withdrawn and reserved lands, some of which include overlapping areas, embrace more than 300,000,000 acres.

CADASTRAL ENGINEERING SERVICE

The Cadastral Engineering Service of the General Land Office executes cadastral surveys and resurveys of the public lands in the United States and Alaska; supervises mineral surveys for patent purposes; prepares the field notes and plats for such surveys; and acts as custodian of the records.

Cadastral engineering activities were carried on in 23 States and the Territory of Alaska, under 215 separate groups, 107 of which in 16 States were resurvey projects. A total of 35,549 miles was surveyed and resurveyed, embracing 5,693,105 acres, in addition to engineering field investigations, miscellaneous surveys, and special projects not measurable on a quantity basis.

In response to requests, surveys and resurveys were made for the Grazing Service, National Park Service, Bureau of Reclamation, Geological Survey, Office of Indian Affairs, and Biological Survey of the Department of the Interior, also for the Forest Service of the Department of Agriculture, and the Department of Justice, and to meet the requirements of location, description, title, exchange, and lease under the public-land laws and policies of the United States.

Survey field notes, 368 township base plats, 158 color overlay sheets, 204 supplemental plats, and 62 special plats of miscellaneous surveys were prepared in final form for the permanent record. In addition, 142 mineral surveys, embracing 450 locations, were examined, platted, and approved.

Accepted surveys and resurveys.—There were accepted and placed on file plats representing 1,340,508 acres of original surveys of public lands and, in addition, 2,878,172 acres of lands were resurveyed, comprising an aggregate area of 4,218,680 acres.

Maps, plats, and diagrams.—The wall map of the United States has been revised to show changes since the publication of the 1938 edition.

A new map of Idaho, showing changes since the 1932 edition, is now being printed.

There have been prepared 391 miscellaneous maps, plats, diagrams, and tracings.

Photolithographic copies, etc.—There were sold 8,476 photolithographic copies of township plats, for which \$4,238 was received; and 6,474 copies were furnished the Bureaus for official use. There were 1,675 maps mounted and distributed for official use, and appropriate distribution was made of 3,315 map publications and 100,801 circulars.

**FORESTRY ON THE REVESTED AND RECONVEYED LANDS IN
WESTERN OREGON**

Resources

Forestry on the revested Oregon & California Railroad (O. & C.) and the reconveyed Coos Bay Wagon Road grant lands, located in 18 counties in western Oregon and aggregating approximately 2,500,000 acres, presents one of the most challenging problems in American forestry. The area contains a total merchantable volume of approximately 50,000,000,000 board feet measure of principally Douglas fir timber. The economic and social importance of these resources, both locally and nationally, places them in the front rank of American forests and calls for the best there is in American forest administration.

Corrective Legislation

The act of August 28, 1937 (50 Stat. 874) laid the foundation and framework for a sound forest policy covering these valuable forest resources. This measure provides for the conservation of land, water, forest, and forage on a permanent basis: the utilization of these resources for the purposes to which they are best adapted; and the realization of the highest current income consistent with sound administrative management. It seeks, through the application of the principle of sustained-yield management, to provide perpetual forests which will serve as a foundation for continuing industries and permanent communities. Since the enactment of the 1937 act, two other laws have been passed to assist in the administration of the O. & C. lands, namely, the act of May 24, 1939 (53 Stat. 753), making provision for the disposition of funds derived from the Coos Bay Wagon Road grant lands, and the act of July 31, 1939 (53 Stat. 1144), authorizing the exchange of the reconveyed lands for lands in State, county, or private ownership in order to consolidate the holdings of the United States.

Forest Policy

The new forest policy which has been formulated for the administration of the revested and reconveyed Oregon grant lands includes some of the most progressive features in American forestry. It aims to place the administration of these lands in the front rank of industrial forestry in the United States and to set an outstanding example for the practice of cooperative sustained-yield forestry in America. The cutting of the timber is being restricted to a volume of 500,000,000 feet board measure per annum pending the completion of a survey of the property and the formulation of a detailed plan of management. Such cutting is directed under rules of forest practice providing for

partial or selective logging in its various forms of tree, group, and area selection. Regulations providing for the sale of timber were approved by the Secretary of the Interior under date of July 7, 1938, and regulations providing for the leasing of grazing privileges were approved July 6, 1939.

Progress in Organization

The law making the practice of sustained-yield forest management mandatory was approved on August 28, 1937. However, funds were not made available for the administration of the project until July 1, 1938, at which time a total of \$135,000 was provided for administration and protection. Of this total, \$74,000 was set aside for fulfilling contracts for protecting the lands from fire, leaving a balance of \$61,000 for timber-sale administration and for organizing the enterprise. An amount of \$160,000 was authorized for the fiscal period ending June 30, 1940, \$80,000 of which was set aside for protection, thus leaving an equal amount for timber-sale supervision, the conducting of investigations, and the formulation of plans. The appropriation for the year beginning July 1, 1940, is the same as for the preceding year.

The problem of finances has been a matter of serious concern to the Department since the regular funds made available have not been sufficient to permit of completing the investigations essential to the effective administration of the property. This handicap has been overcome to some extent by the allocation of \$100,000 from Public Works funds, and it now appears that the greater part of the work of investigation and planning will be completed during the fiscal year 1941. The act of August 28, 1937, authorizes appropriations for administration of 25 percent of the revenues derived from the sale of timber, and experience has demonstrated that sound management is possible of attainment on this basis. However, investigation, classification, and planning costs are not direct charges against administration and should not be so interpreted.

An appraisal of the current status of the O & C project shows the marked progress which has been made in carrying out the requirements of the 1937 act. Within a period of 2 years a well-balanced technical organization has been established; the principles of selective cutting and sustained-yield management have been introduced; a large volume of improvement work, including the establishment of forest nurseries and forest plantings, has been carried out; and, finally, work in assembling the forest and economic facts essential to the division of the area into sustained-yield units is nearing completion.

Results of Operations

Although the enactment of the act of August 28, 1937, required a drastic reorganization of the entire O. & C. project, the prevailing demand for timber made it necessary to continue sales at a rate which would keep industry fully supplied.

The cash income from timber operations for the 3-year period ended June 30, 1940, totaled \$1,886,151, namely, \$614,663 for the year 1938, \$421,266 for 1939; and \$850,222 for the fiscal year 1940. These results reflect an average annual income of \$628,717 for the period under review. The average annual cash income from these lands for the past 3 years materially exceeds that which was realized during the preceding 20 years, namely, 1918 to 1937, inclusive. During this period a total cash income of \$9,041,332 was received from the sale of timber. This result reflects an average annual income of \$452,066 or \$176,651 less than that for the 3-year period just ended.

The total cash income received during the period 1938 to 1940, in which the property has been administered under principles of sustained yield, was \$1,886,151. The total cost of administration and protection during this same period was \$455,000, thereby reflecting a net income of \$1,431,151 and a ratio of cost to income of less than 24 percent. The volume of timber-sale business carried out in 1940 exceeds that of any former fiscal period since 1918, making an exception of the single year of 1924. The volume of timber sold increased substantially during 1940, and it is expected that there will be a further increase in production during 1941. However, current depletion is still well under the sustained-yield capacity of the O. & C. forests, thus leaving a comfortable margin for expansion.

RANGE DEVELOPMENT SERVICE

Appropriation

Under the act of May 10, 1939 (53 Stat. 691), \$60,000 was appropriated for the construction, purchase, and maintenance of range improvements on the public lands subject to grazing leases under the provisions of section 15 of the Taylor Grazing Act of June 28, 1934, as amended (48 Stat. 1269; 49 Stat. 1976), with the limitation that expenditures for the purpose named should not exceed 25 percent of the receipts during the fiscal years 1939 and 1940. The receipts for these years totaled \$289,743.47.

Allocation of Funds

The expenditures for range improvements, including administration, were \$38,052.62. Improvements were made in the States of Wyoming and Montana, in nearly equal ratio, these States having contributed

approximately 60 percent of all receipts received from the grazing leases. As additional funds are appropriated equitable distribution thereof will be made among the other contributing States.

Range Program

In Wyoming the principal range improvement consisted in the development of watering places for stock. In Montana the development of springs, the construction of stock-watering reservoirs, and fencing, comprised the chief activities. Most of the improvements are so located as to benefit the greatest number of stockmen in the area. In many cases cooperative agreements were entered into between the United States and the lessees, whereby the lessees agreed to contribute labor in constructing the projects, and maintaining them, after completion.

Range Improvements

In Wyoming, 44 range improvements, benefiting 255,830 acres, were constructed at a cost to the United States of \$17,770.94, and in Montana 43 range improvements, benefiting 267,394 acres, were constructed at a cost to the United States of \$14,320.79.

THE ALASKAN FIRE CONTROL SERVICE

Protection of Forests on Public Lands in Alaska

The General Land Office is charged with the administration of approximately 325,000,000 acres of public domain in the Territory of Alaska, of which approximately 250,000,000 acres are in need of fire protection. The magnitude of this protection problem can be better realized by stating that this area is about 60 percent greater than is that of all the national forests of the continental United States. The area in need of protection consists of approximately 40,000,000 acres of fairly dense forests of white spruce and birch, 110,000,000 acres of open woodland and interspersed grasslands, and 100,000,000 acres of tundra vegetation in the extreme north and northwest sections of the Territory.

The interior of Alaska has an annual precipitation of less than 15 inches and the summers are long and dry with almost continuous daylight. The fire hazard is extremely high and this fact, coupled with a lack of appreciation of the ill effects of fire by the general public, has resulted in serious losses annually since the development of Alaska was initiated.

Although officials of the Department of the Interior and the General Land Office have recognized the need for a protection program for the forests of the interior of Alaska over a long period of years, no funds

were provided for this purpose prior to the year 1939. An item of \$37,500 was included in the Department Appropriation Act for the fiscal year 1940 for the prevention and suppression of fires on the public domain of Alaska. While it is realized that this appropriation, which represented only one-half of the amount recommended, was inadequate, a fire-protection unit, directed by a forester with many years of experience in the Territory, has been organized; this skeleton organization is supplemented by the Civilian Conservation Corps, and major forward steps have been taken looking to the solution of the problem.

Program

The program during the year 1940 consisted principally of the conducting of a vigorous educational campaign with a view to enlightening the public upon the economic importance of the destructible resources of Alaska, the seriousness of the fire situation, and the direct losses which were being sustained by the Territory largely as a result of human carelessness. Active cooperation was secured from the public, the Federal agencies operating in Alaska, newspapers and radio stations, local organizations, chambers of commerce, and sportsmen's clubs. A short-term course on forest conservation and protection was conducted in cooperation with the University of Alaska.

The establishment of an adequate system of protection for the forests of Alaska is a matter of vital concern to the Nation, especially in view of the existing emergency. Defense activities in progress and those in prospect will greatly increase the fire hazard, and serious losses will result unless the protection organization is materially strengthened.

CIVILIAN CONSERVATION CORPS

Conservation of Forest Resources on the Oregon & California Revested Lands in Oregon

Conservation program.—The vast timber resources of the nearly 2,500,000 acres of the Oregon & California revested railroad grant lands are managed on a sustained yield basis for the purpose of providing a continuous forest crop to maintain and stabilize local forest industries.

The Civilian Conservation Corps assisted in attaining this objective through the camps in Oregon assigned to the General Land Office, by providing facilities for increased protection and more efficient utilization of the forest resources.

The more important types of work engaged in were:

Truck trail construction.—The construction of forest truck trails or roads was one of the more important jobs conducted in the camps. Their value for protection is of paramount importance, as they fur-

nish fire-fighting crews a means of quick access into the more generally inaccessible forest areas. Work accomplished during the year included the construction of 42.9 miles of roads, the maintenance of 114.5 miles of truck trails, and the building of 15 vehicle bridges.

Fire suppression.—The General Land Office camps have been of great value in preventing and suppressing forest fires. There were 58 fires worked on and controlled.

Reforestation.—A considerable portion of the Oregon and California lands is not reforesting naturally, and many acres of Oregon's most valuable forest land have been made nonproductive through successive burning. By artificial reforestation and protection these lands can be made to produce forest products from which commensurate returns may be expected. Nine hundred thousand seedlings were planted on 1,010 acres.

In connection with the reforestation work, a forest nursery with an annual capacity of 1,000,000 seedlings is being operated. Port Orford cedar is the principal species being grown, although 200,000 ponderosa pine and an approximately equal number of Douglas fir seedlings, which will be used in field planting of denuded areas, are growing.

Fire hazard reduction.—A total of 44.9 miles of roadsides was cleaned up and much other fire hazard reduction work was done.

Tree and plant disease control.—The work of controlling the white pine blister rust in valuable Oregon and California sugar pine areas in southern Oregon, carried on in cooperation with the Bureau of Entomology and Plant Quarantine and the United States Forest Service, was completed on 735 acres.

Telephone lines.—A total of 22.7 miles of new forest protection telephone lines has been completed and an additional 24.2 miles have been rebuilt and maintained. A total of 1,036 man-days of labor was used.

Miscellaneous.—In addition to the work listed above, the camps engaged in other activities, such as the construction of buildings, guard rails, and horse trails, surveying seed collections, mapping, etc.

Safety program.—The camps have enjoyed a year which has not been marred by any serious accidents.

Control of Coal Fires in Wyoming

Working under the supervision of the General Land Office, the Civilian Conservation Corps has saved an incalculable amount of the Nation's coal resources from destruction by controlling the underground coal fires that for many years have been consuming many of the large coal beds in public lands in the vicinity of Little Thunder Basin, Wyo.

During the year 13 separate coal-bed fires were worked upon. Three of the projects were definitely completed and work is progressing satisfactorily upon the others. One fire of very recent origin was taken out completely in 16 working days.

There yet remain several other coal-bed fires near Gillette, Wyo., upon which work must be done in order to prevent the destruction of this irreplaceable natural resource.

LAND CLASSIFICATION

Objectives

Problems relating to the classification of the public lands under the administration of the General Land Office have been dealt with by the Branch of Planning, Use, and Protection. The broad objective has been the promoting of conservation and prudent use of the public domain. Land Classification has been utilized to prevent disposal of the public lands for purposes inconsistent with their use capabilities. Lands embraced in homestead, public sale, and other applications have been classified to the end that disposal will not be detrimental to the applicant, the local community, or the general public. At the same time, it has been recognized that the public interest demands the fullest beneficial use of the public lands consistent with their use capabilities. Therefore, classification of the public domain has also proceeded in terms of recommended uses and attention has been given to policies and programs necessary to effectuate these uses.

Classification Reports

The work of land classification in the General Land Office was begun about February 1, 1940. During the balance of the fiscal year definite progress was made toward classifying lands embraced in pending applications. More than 850 classification reports were prepared during that period. The lands covered by the classification reports were located in 23 of the 25 public land states and were applied for under the homestead, public sale, desert land, timber and stone, lieu selection, exchange, and other provisions of the public land laws.

As an integral part of classification, it has been necessary to assemble and analyze basic data pertaining to land characteristics and conditions of land use. These data, including reports and maps prepared by agencies both within and outside of the Department, will, in time, constitute a land use reference library.

Platting the Public Domain

To aid classification, the public domain has been platted in part, in sufficient detail to reveal the distribution pattern of the public lands and their relation to privately and other publicly owned lands. As this work progresses, it is believed that certain exchanges and consolidations which would facilitate beneficial use of the land may be determined from the plats.

Land Classification in Alaska

Coincidental with the classification of the public domain in continental United States, preliminary field work has been initiated for the classification of the public lands in the Territory of Alaska. The importance of this classification has been increased by recent interest in the constructive development of the territorial resources. The work will proceed in cooperation with other bureaus of the Department and with other departments.

RESEARCH AND ANALYSIS

Organization and Problems

A Research and Analysis Division has been established in the General Land Office to aid in administering the conservation program.

The first approach of the Division to the problems at hand was to inventory certain portions of the remaining public domain. It has completed or has under completion several projects of this kind.

Mineral Reservations in Outstanding Patents

The first project involved the collection of statistical data showing mineral reservations in patents issued since 1910. These data have been abstracted up to 1936. The records indicate that up to such date almost 200,000 patents, embracing 36,000,000 acres, had been issued, in which some or all of the minerals are reserved to the Federal Government.

Federal Land Inventories

The second project consisted of inventorying the vacant, unappropriated, and unreserved public land in the public-land States having no district land offices. This work is nearly completed.

The third project consisted of an inventory of all Federally owned lands in the United States outside the corporate limits of municipalities, and the recording of such lands on county maps and standard forms. This project was transferred from the National Resources Planning Board, as of January 17, 1940.

Project units were set up in cooperation with the Work Projects Administration in the General Land Office, all district land offices and several public survey offices. The first step is to secure information concerning all Federally owned lands of record in these offices. It is estimated that about 20 percent of the inventory has been completed.

Town Site Project

A fourth project which deals with an interesting chapter of the development of the West consists of a compilation of information concerning town sites which have been established by the General Land Office on public land.

Need for Better Records

Consideration is being given to the establishment of a card-index system, to supplement the existing tract book, patent and general file records, with respect to individual tracts of present or former public lands.

RECEIPTS AND EXPENDITURES

General.—The total cash receipts from leases, sales, and other disposals of public lands (including receipts from copies of records, sales of Government property, etc.) were \$7,017,023.18 and from Indian lands \$40,918.98, an aggregate of \$7,057,942.16, all of which was deposited in the Treasury. The total expenditures from appropriations made for the conduct of the Bureau were \$2,237,720.10. The excess of receipts over expenditures was \$4,820,222.06. Collections under section 3 of the Taylor Grazing Act were transferred to the Grazing Service as of July 1, 1939.

Receipts under mineral leasing acts.—Receipts from bonuses, royalties, and rentals under laws providing for the leasing rights on the public domain (including royalties and rentals on potash deposits and royalties on coal leases in Alaska) aggregated \$5,637,153.11, of which \$5,201,995.43 was received under the act of February 25, 1920 (41 Stat. 437).

The largest receipts under this act were from lands in California, the amount being \$2,120,198.05. Wyoming was second with \$1,742,103.97. Receipts from other States follow: New Mexico, \$851,093.06; Utah, \$141,373.28; Colorado, \$116,401.92; Montana, \$114,533.30; Louisiana, \$80,094.62; North Dakota, \$18,898.78; Alabama, \$5,782.30; Arizona, \$3,739.66; Washington, \$3,353.76; Oklahoma, \$1,804.15; South Dakota, \$806.71; Kansas, \$738.25; Idaho, \$643.83; Nebraska, \$220; Nevada, \$157.29; and Michigan, \$52.50.

Under the provisions of the mineral leasing act cited, each State receives $37\frac{1}{2}$ percent of the receipts from the public lands within its borders, the reclamation fund receives $52\frac{1}{2}$ percent and the other 10 percent remains in the Treasury of the United States as a part of the general fund.

Receipts under the Taylor Grazing Act.—Fees and rentals from leases issued for public lands under section 15 of the act amounted to \$152,378.34. The largest receipts were from lands in Wyoming, where \$69,556.41 was collected. Receipts from other States were as follows: Arizona, \$22,383.38; Montana, \$18,223.33; New Mexico, \$9,735.03; Colorado, \$8,789.09; California, \$8,016.06; Idaho, \$6,195.41; Oregon, \$4,843.17; South Dakota, \$2,304.38; Washington, \$2,258.27; Arkansas, \$36.07; Oklahoma, \$27; and Nebraska, \$10.74. The States within which the lands are situated will receive 50 percent of these receipts.

Distribution of receipts.—Receipts from all sources, aggregating \$7,057,942.16, as shown above, are distributed under the law approximately as follows: Reclamation fund, \$3,055,719.63; for range improvements, \$71,399.77; to public land States and certain counties within such States, \$2,848,406.28; to various Indian tribes, \$36,762.85; and to the general fund of the Treasury, \$1,045,653.63.

Under the provisions of the Taylor Grazing Act, the States within which the lands are situated receive 50 percent of the receipts from public lands and 25 percent of the receipts from ceded Indian lands; 25 percent of the receipts from both public and ceded Indian lands is available, when appropriated by Congress, for range improvements; 50 percent of the receipts from ceded Indian lands is credited to the Indians; and the balance is credited to the general fund in the Treasury.

Five percent of the net proceeds from cash sales of public lands is paid to the public-land States within which such sales were made, and the balance of such receipts from States named in the Reclamation Act is credited to the reclamation fund; the reclamation fund and the States involved receive 90 percent ($52\frac{1}{2}$ percent and $37\frac{1}{2}$ percent, respectively) of the receipts under the mineral leasing act and of receipts from potash deposits leased under the act of February 7, 1927; receipts from sales of reclamation town sites and camp sites and from royalties and rentals from potash deposits leased under the act of October 2, 1917, are credited to the reclamation fund; 75 percent of the receipts from the Oregon & California Railroad grant lands is paid to the counties within which the lands are situated and 25 percent is credited to the general fund of the Treasury. Not to exceed 75 percent of the proceeds of land and timber in the forfeited Coos Bay Wagon Road grant is paid in lieu of taxes to the

counties within which the lands are situated. The balance of such proceeds is credited to the general fund in the Treasury. The receipts from Indian lands (except 37½ percent of royalties from Red River oil lands which is paid to the State of Oklahoma in lieu of taxes) are deposited in the Treasury to the credit of the various Indian tribes. All other moneys are deposited in the Treasury to the credit of the general fund.

The following table shows in detail the distribution of the receipts insofar as is possible before final settlement of all accounts by the General Accounting Office:

	Distribution in the Treasury				
	General fund	Reclamation and range improvement	State and county funds	Trust funds	Total
Sale of public lands.....	\$71,262.18	\$41,251.90	\$4,688.09	-----	\$117,202.17
Fees and commissions.....	14,103.00	51,854.72	-----	-----	65,957.72
Receipts from mineral leases.....	539,780.83	2,731,047.60	1,950,748.29	-----	5,221,576.72
Receipts from Oregon & California R. R. grant lands.....	186,202.12	-----	558,606.36	-----	744,808.48
Receipts from Coos Bay Wagon Road grant lands.....	60,413.88	-----	45,000.00	-----	105,413.88
Receipts under Taylor Grazing Act:					
Sec. 3 (within grazing districts).....	33,048.84	33,305.19	66,354.04	\$512.67	3 133,220.74
Sec. 15 (outside grazing districts).....	38,094.59	38,094.58	76,189.17	-----	152,378.34
Potash royalties and rentals.....	37,907.08	226,978.90	142,151.53	-----	4 407,037.51
Rental for rights-of-way:					
Power transmission lines.....	16,068.05	-----	-----	-----	16,068.05
All other.....	6,597.88	-----	-----	-----	6,597.88
Sale of reclamation town lots.....	-----	4,586.51	-----	-----	4,586.51
Sale and lease of Indian lands.....	-----	-----	4,668.80	36,250.18	5 40,918.98
Copying fees.....	18,384.51	-----	-----	-----	18,384.51
Miscellaneous (including sale of standing timber, coal leases and town lots in Alaska, rent of land, etc.).....	23,790.67	-----	-----	-----	23,790.67
Total.....	1,045,653.63	3,127,119.40	2,848,406.28	36,762.85	7,057,942.16

¹ First and last columns include \$19,581.29 royalties received in Wyoming under the act of June 26, 1925.

² Estimated.

³ This amount was collected prior to July 1, 1939, but not covered into the Treasury until the current fiscal year.

⁴ Second and last columns include \$27,966.76 royalties received in California under the act of Oct. 2, 1917. The balance of this item represents royalties and rentals under the Act of Feb. 7, 1927.

⁵ Includes \$12,456.51 royalties and rentals from oil and gas leases for Kiowa, Comanche, and Apache lands south half of Red River, Okla., of which the State receives 37½ percent of the royalties in lieu of taxes.

REPAYMENTS

The act of June 16, 1880 (21 Stat. 287), and the act of March 26, 1908 (35 Stat. 48), as amended by the act of December 11, 1919 (41 Stat. 366), provide for the return of moneys received in connection with the disposal of public lands and covered into the United States Treasury.

Repayment may be made to the land applicant or his heirs or assigns, where lands have been erroneously sold, where payments have been made in excess of lawful requirement, and where applications, entries, and proofs have been rejected, no fraud appearing. Under said laws

there were stated 52 accounts, allowing repayment of \$7,399.75, and 10 claims were denied. The claims allowed include one account granting repayment of \$10 received in connection with a homestead entry of ceded Indian lands and repaid from Indian trust funds.

MINERAL LEASES AND MINING CLAIMS

Oil and gas leases and permits.—On June 30, 1939, there were outstanding 2,353 leases issued under the act of February 25, 1920, and the amendatory act of August 21, 1935. During the fiscal year 1940, 2,084 new leases were issued and 69 leases were canceled, leaving on June 30, 1940, a total number of 4,368 leases outstanding for an aggregate of 4,703,934.88 acres. Except for 126 permits remaining in Alaska all permits have expired and the permit system has been superseded by a leasing system.

Coal, potash, phosphate, sodium, and sulphur permits, leases, and licenses.—On June 30, 1939, 369 coal leases for 68,552.20 acres were outstanding; 15 leases were issued and 19 leases, including one in part, were canceled, leaving 365 coal leases outstanding for an area of 68,050.47 acres. Coal permits outstanding on June 30, 1939, numbered 121 for 92,566.48 acres; 31 new permits were issued, 9 coal permits, including two in part, were canceled, and 7 permits expired, leaving outstanding 136 coal permits for 105,106.08 acres. Coal licenses outstanding on June 30, 1939, numbered 85 for 3,301.71 acres; 13 new coal licenses were issued, one license was canceled, and three licenses expired, leaving on June 30, 1940, 94 coal licenses for 3,631.53 acres.

There were on June 30, 1939, 16 potash leases embracing 40,882.66 acres; five leases were issued, increasing the potash leases to 21 for a total of 47,092.10 acres. The 12 potash permits covering 15,274.49 acres, which were outstanding at the beginning of the year, expired; no permits were issued, action thereon being suspended in accordance with departmental order No. 914 of April 5, 1935.

The status of the 7 outstanding phosphate leases covering an area of 3,292.90 acres remained unchanged; no leases were issued, action thereon being suspended in accordance with departmental order No. 1294 of July 2, 1938.

The 3 sodium leases covering 1,191.88 acres and outstanding on June 30, 1939, remained intact; sodium permits outstanding increased from 43, covering 66,742.37 acres, to 80, embracing 144,567.37 acres, when 54 new permits were issued; 3 permits, including one in part, were canceled and 14 permits expired.

Twenty-seven sulphur permits were in effect on June 30, 1939, covering 17,508.01 acres; 11 new permits were issued; 9 permits expired,

leaving on June 30, 1940, 29 sulphur permits outstanding, embracing 18,517.29 acres.

Mineral applications and entries.—There were 85 mineral applications awaiting action on June 30, 1939; 28 new applications were received and 39 applications were finally disposed of, leaving 74 applications, embracing 4,336.80 acres. On June 30, 1939, there were pending 105 mineral entries, for 6,098.40 acres; 123 new mineral entries were received; patents issued for 133 entries, embracing 6,952,326 acres, leaving pending on June 30, 1940, 95 mineral entries, covering 5,364,074 acres.

Mineral contests.—On June 30, 1939, there were 35 mineral contests pending; during the year 113 new contests were received; 108 were finally disposed of, leaving on June 30, 1940, 40 contests pending.

RIGHTS-OF-WAY

Five hundred and seventy-four new applications for railroads, reservoirs, telephone and telegraph lines, public roads, pipe lines, etc., were received, which, added to 162 pending, made a total of 736. Four hundred and sixty-two were approved or otherwise disposed of, leaving 274 pending. Seventy-seven maps of approved rights-of-way in Indian and forest reservations were received and the approvals promulgated.

There were received for action requiring proof of construction 67 cases which, added to 539 awaiting action, made a total of 606. Seventy-six of these cases were acted upon, leaving 530 pending.

FEDERAL RECLAMATION PROJECTS

There are 45 Federal reclamation projects in 14 western States, 35 of which are operated in whole or in part by the water users. There are, in addition, 5 Indian reclamation projects, the irrigation features of which are under the supervision of the Office of Indian Affairs.

One thousand and fifty reclamation cases of various kinds were received and 1,000 were acted upon. One hundred and sixty-three reclamation entries were patented, containing 14,144.34 acres.

DESERT-LAND ENTRIES

Eighty-four entries involving 13,239.65 acres were patented under the desert-land laws which provide for entries by individuals, who are required to irrigate and cultivate the lands.

CAREY ACT

Carey Act segregations amounting to 50,238.48 acres were considered under the act of August 18, 1894 (28 Stat. 422), known as the Carey Act, which was designed to encourage large-scale reclamation of arid lands in certain States. The lands must be reclaimed by the States and disposed of by them to actual settlers. One application under the act of March 15, 1910 (36 Stat. 237), requesting the temporary withdrawal of 12,711.92 acres, is pending.

PITTMAN ACTS

The patenting of public lands in Nevada on the discovery and development of underground waters is authorized by the Pittman Acts of October 22, 1919 (41 Stat. 293), and September 22, 1922 (42 Stat. 1012). There were pending 21 cases; 18 were received; total, 39. There were patented 3 cases; 33 were otherwise disposed of; pending, 3.

SWAMP AND OVERFLOWED LANDS

Under the Swamp-Land Acts which were intended to aid the States in reclaiming lands by the construction of permanent levees, there were approved and patented to the States 2,561.39 acres. Claims for 3,538.61 acres were finally rejected. New claims were asserted for 4,256.25 acres.

STATE GRANTS AND SELECTIONS

The area of the indemnity school selections on hand and received for consideration amounted to 347,395.22 acres. Selections embracing 117,482.30 acres were approved and title conveyed to the States. Canceled selections included 1,698.97 acres. Selections aggregating 228,213.95 acres were pending at the close of the year.

Selections under quantity grants to States for specific purposes, embracing 7,400.40 acres, were approved and title conveyed to the States. Title to 40 acres was confirmed by the issuance of a supplemental patent. The selections pending at the close of the year embraced 169,384.49 acres.

Applications for patents for granted school sections under the provisions of the act of June 21, 1934 (48 Stat. 1185), were approved to the extent of 793,846.58 acres. New applications embracing 464.96 acres were received. Such applications pending at the end of the year embraced 691,533.03 acres.

EXCHANGES WITH STATES

New applications by the various States, under the Taylor Grazing Act, for exchanges of lands embracing 60,004.44 acres were received. Sixty-four patents containing 185,571.81 acres, with a reservation of all minerals to the United States were issued. The rejected and relinquished applications involved 746,251.80 acres.

Other State exchanges approved or patented involved 20,780.94 acres.

RAILROAD GRANTS AND SELECTIONS

One new railroad selection embracing 793.86 acres was received and 10,136.61 acres were certified or patented as indemnity selections.

ALASKA

On June 30, 1940, there were 28 fur farm leases outstanding, covering approximately 143,780 acres, the annual rental of which is \$760. Six renewal leases were issued, 6 leases were canceled, 3 applications for lease are pending, and 3 applications for lease were rejected and closed.

Eleven grazing leases, covering approximately 807,832 acres, from which the sum of \$922.55 was received, were outstanding on June 30, 1940. One lease was canceled, 9 applications for lease are pending, and 3 applications for lease were rejected and closed.

The sale of 5-acre tracts in Alaska for homesites or headquarters was considered in 107 instances and 18 patents issued for a total of 61.72 acres, and 2 applications were finally rejected and closed.

The sale of lands in Alaska for trade, manufacturing, or other productive industry sites was considered in 33 instances and 4 patents issued for a total of 75.93 acres.

AVIATION LEASES

On June 30, 1940, 22 aviation leases, covering 11,056.92 acres, and 5 beacon-light permits, covering 954.84 acres, were outstanding. Five leases were canceled, 1 new lease and 4 renewal leases were issued, and 3 applications for lease are pending.

COLOR OF TITLE

General color-of-title claims were considered in 142 instances and 16 patents issued for a total of 511.34 acres, while 13 applications were finally rejected and closed. Two applications involving Texas-New Mexico color-of-title claims were finally rejected and closed. One case under a special act involving land in Utah, claimed under color of title, is pending.

EXCHANGES

Existing laws authorize the Secretary of the Interior to acquire title to privately owned lands in exchange for Government lands in promoting matters of public interest, such as the establishment of grazing districts, wildlife and bird refuges, the elimination of private holdings within national parks, monuments, and Indian reservations, the grouping of Government lands and State-owned lands, and the consolidation of national forests and Government timberlands. Exchanges were consummated which resulted in additions to Indian reservations of 183,748.17 acres in exchange for 190,498 acres of Government land; to national monuments of 2,563.38 acres in exchange for 5,106.98 acres of Government land; to grazing districts of 4,360 acres in exchange for 3,543.95 acres of Government land; and to national forests of 302,215.67 acres in exchange for 43,371.52 acres of Government land and timber, timber being permitted in these cases and timber being the consideration given by the Government in 80 percent of the forest exchange cases. Exchanges are nearing completion which will result in the addition of approximately 5,300 acres of privately owned land to a bird and wildlife refuge in exchange for approximately the same amount of Government land. These exchanges necessitated the examination of abstracts and other evidence in the acceptance of title in behalf of the United States to a total of 492,887.22 acres and the issuance of patents for the total of 242,520.45 acres.

A proposed forest exchange involving 10,000 acres of privately owned land was held as not being in the public interest and was rejected and closed, while two exchange proposals, involving 10,000 acres of privately owned land in a national forest for approximately 100,000 acres of grazing district land, were rejected and closed.

GRAZING LEASES

During the year, 1,673 offers of grazing leases were made under section 15 of the Taylor Grazing Act, involving approximately 1,604,595 acres, with an annual rental of \$30,986.60. Sixty-five leases involving an area of 41,433.87 acres with annual rentals totaling \$960.90 were canceled. There were outstanding on June 30, 1940, 5,559 leases covering an area of 7,411,986.77 acres, with a total rental of \$149,506.88. Approximately 550 applications for lease were finally rejected and closed and 1,749 applications are pending.

INDIAN LANDS AND CLAIMS

In former Indian reservations, ceded to the United States for disposition under the public-land laws, 206 homestead entries and purchases were patented and 412 were canceled.

As to Indian claims or allotments, 55 fee patents, 17 trust patents, and 2 Indian homestead patents were issued. A total of 183,748.17 acres was added to Indian reservations through the medium of exchange, and a total of 190,498 acres of Government land was patented to private parties in exchange therefor. Several reports were made concerning the lands available for inclusion within Indian reservations and for restoration to tribal ownership under the Wheeler-Howard Act.

LEASES OTHER THAN AVIATION, GRAZING, AND MINERAL

One hot-spring lease, covering 20 acres in Montana, is outstanding from which the Government received \$344.60 under the terms of the lease.

One medicinal spring lease, embracing 40 acres in California, is outstanding and an annual rental of \$20 was received therefrom.

Sixteen recreational leases, covering 19,639.27 acres, are outstanding.

PRIVATE LAND CLAIMS

Private land claims which had attached to land under foreign sovereignties, prior to the cession of the territory involved to the United States, were considered in 123 instances and 18 patents issued for a total of 8,333.62 acres.

TIMBER

Sales of dead, down, or damaged timber, were considered in 65 instances and the sum of \$434.55 was received therefrom. Free-use timber permits were considered in 32 instances.

TOWN LOTS AND TOWNSITES

Townsite work resulted in the patenting of 171 town lots, the total sale price of which amounted to \$110,720.80. Some of these lots were sold in prior fiscal years and part payments therefor were made during such years. Six townsite patents embracing a total of 74.78 acres were issued. Regulations were issued to govern the sale of lots in three townsites.

MISCELLANEOUS

Other patents were issued covering entries, selections, and claims as follows: Homesteads in abandoned military reservations, 4; military bounty land warrant location, 1; cash entries, 25; credit entries, 3; cemetery site, 1; cash entries under the Arkansas drainage law, 3; forest lieu selections, 6; five-acre homestead tracts in Alaska, 18; claims of non-Indians in Indian pueblos in New Mexico, 2; parks, 2; riparian

right claims, 3; scrip locations, 3; small holding claims, 2; and soldiers' additional homestead entries, 16. There were also 9 quitclaim deeds issued.

HOMESTEAD ENTRIES

Actions were taken in homestead cases as follows: On final and commuted homesteads, 4,061, of which 3,228 were patented for an area of 1,243,467 acres. There also were acted upon applications to make homestead entry, 1,638; applications to amend, 88; applications for leaves of absence, 81; applications for extension of time to establish residence, 22; applications for extension of time to make final proof, 68; original homestead entries, 4,519, of which 2,098 were canceled; applications for change of residence requirement, 12; election intermarriage of homesteaders, 3; applications for permission to make final proof outside of land districts, 18; notices of intention to make final proof, 186; appeals from register's and office decisions, 285; and on special agent's reports, 1,158. These figures do not include homestead entries of ceded Indian lands.

PUBLIC SALE AND TIMBER AND STONE APPLICATIONS

Public sale applications under section 2455, R. S., as amended, receiving action were 1,178, of which 48 were patented for an area of 5,871 acres. Timber and stone cases receiving action were 51, of which 4 were patented for an area of 413 acres.

FILING OF PLATS OF SURVEY

Letters of instruction were issued for the filing of 323 plats of survey for lands in States in which there are district land offices. Twenty-six plats were directly filed by this office in connection with which 10 public notices were prepared for lands in states in which there are no district land offices.

NATIONAL FOREST HOMESTEAD LANDS

Nine thousand three hundred and forty-nine acres in national forests which had been listed for homestead entry under the act of June 11, 1906 (34 Stat. 233), were returned to national forests by revocation of the listing orders, and 494 acres were restored to homestead entry under the act.

CONTESTS, OTHER THAN MINERAL CONTESTS

Three hundred sixty-four contests, including both Government and private, were considered. Approximately 136 hearings were held in Government proceedings. At the close of the year about 116 contest cases were pending.

TRACT BOOK NOTATIONS

The General Land Office maintains about 4,000 tract books in which notations are made of all transactions affecting the public lands. These volumes are designed to show at all times the status of each smallest legal subdivision of the public lands. More than 100,000 notations were made on these records during the fiscal year.

STATUS SHEETS

A total of 15,857 status sheets giving the status of particular lands, with respect to conflicts, rights-of-way, withdrawals, etc., were prepared for use in the adjudication of applications, entries, etc.

TOWNSHIP DIAGRAMS

There were prepared 1,750 township diagrams showing lands disposed of by the Government in particular townships and fractional townships and the status of the remaining lands in such townships. Some of these plats were made on request of individuals who tendered the required payment therefor.

SUPPLEMENTAL PATENTS

The act of April 14, 1914 (38 Stat. 335), authorizes the issuance of new or supplemental patents, without coal reservations, if, after the issuance of the original patents with such reservations, the lands are classified as noncoal in character. Such new or supplemental patents, without coal reservations, were issued in 376 cases.

WITHDRAWALS AND RESTORATIONS

The area of existing power-site reserves was increased by 3,737 acres, the public water reserves by 1,680 acres, and the lands classified as valuable for hydroelectric power purposes were increased by 8,955 acres. Tracts aggregating 28,000 acres were restored from power-site designations under the Arizona and New Mexico Enabling Act and the Oregon and California Railroad Company Revestment Act, while the areas in reclamation projects under the act of June 17, 1902, were decreased by 363,940 acres.

The Kings Canyon National Park was established in California and the Olympic National Park in Washington was enlarged, involving the reservation of 642,011 acres. One new national monument was created, two were enlarged, and one was reduced, the net decrease being 68,903 acres. The area of the national forests was increased by 4,225,954 acres. Two new wildlife refuges were established and four were enlarged, the increase amounting to 125,807 acres. Withdrawals aggregating 3,727 acres in Alaska and in the States were made for air-navigation sites for the Civil Aeronautics Board and on the recom-

mentation of the Alaska Road Commission, and 49 acres were released from former withdrawals for such use. Two leases involving 5,693 acres were issued under the recreation law to the county of Pima, Ariz., one lease was canceled and one superseded by a grant, and four petitions to lease or purchase were denied. Four new stock driveways were created and eight enlarged. All stock driveways within certain grazing districts, and other driveways outside of grazing districts were reduced or revoked, resulting in a net decrease of 224,675 acres.

A withdrawal of 116 acres was made at the request of the Farm Security Administration for use in resettling farm families in New Mexico. Public lands aggregating 76,731 acres in South Dakota were withdrawn for the use of the Department of Agriculture in connection with a land-utilization project, and a withdrawal for classification and use as a grazing project of all public lands in four counties in that State was revoked as to all lands not now within the project. One withdrawal previously made in aid of a similar project was enlarged and one was revoked, resulting in a net decrease of 93,901 acres. A withdrawal of 21,005 acres in Idaho was made in aid of pending legislation, an agricultural experiment reserve of the Department of Agriculture in New Mexico was increased by 2,554 acres, and other reserves for various purposes were increased by 38,790 acres. A withdrawal of 1,280 acres in New Mexico for archaeological examination was revoked. General withdrawals for classification were reduced by 122,850 acres through the placing of the lands involved in withdrawals for specific purposes.

Mineral Leases, Permits, and Licenses Outstanding June 30, 1940, by Classes

Class	Leases		Permits		Licenses	
	Num-ber	Acres	Num-ber	Acres	Num-ber	Acres
Oil and gas.....	1, 265	566, 612				
Oil and Gas Act, Aug. 21, 1935.....	3, 103	4, 137, 322				
Coal.....	365	68, 050	136	105, 106	94	3, 631
Potash.....	21	47, 092				
Phosphate.....	7	3, 292				
Sodium.....	3	1, 191	80	144, 567		
Sulphur.....			29	18, 517		
Total.....	4, 764	4, 823, 559	245	268, 190	94	3, 631

SUMMARY

Class	Num-ber	Acres
Leases.....	4, 764	4, 823, 559
Permits.....	245	268, 190
Licenses.....	94	3, 631
Total.....	5, 103	5, 095, 380

Leases Other Than Mineral, Outstanding on June 30, 1940

Class	Number	Acres	Class	Number	Acres
Term grazing leases under Taylor Grazing Act	5,559	7,411,987	Recreational leases:		
Grazing leases, Alaska	11	807,833	Act of June 14, 1926	16	19,639
Fur farm leases, Alaska	28	143,780	Act of June 30, 1932	1	20
Aviation leases and permits:			Boy Scout lease: Act of Jan. 21, 1927	1	80
Leases	22	11,057	Water well: Sec. 40, Mineral Leasing Act	2	80
Beacon permits	5	955			
Mineral or medicinal spring leases	1	40	Total	5,646	8,395,471

Original Entries and Selections Made During the Fiscal Year Ended June 30, 1940¹

	Public land		Indian land	
	Number	Acres	Number	Acres
Homesteads:				
Stock raising	5	3,639		
Enlarged	6	1,753	1	322
Reclamation	162	21,148	23	2,692
Forest	13	1,200		
Sec. 2289 et al.	163	18,389	10	99
Total original homesteads	349	46,129	34	4,013
Deserts	8	940		
State selections	9	1,716		
Railroad selections	3	794		
Mineral applications and adverse claims	126		1	
Miscellaneous	35	210		
Total original entries and selections	530	49,789	35	4,013
Indian land, as above	35	4,013		
Total	565	53,802		

¹ An original entry or selection of public land is one made in pursuance of an act of Congress which prescribes the terms and conditions under which patent may be issued or other evidence of title granted.

Final Entries, or Entries Based on Final Certificates, Issued During the Fiscal Year Ending June 30, 1940¹

	Public Land		Indian Land	
	Number	Acres	Number	Acres
Homesteads:				
Stock raising	1,172	567,926	102	32,747
Enlarged	112	27,199	180	27,741
Reclamation	101	9,678	60	6,359
Forest	17	1,570	1	60
Commuted	13	1,531	17	1,231
Section 2289 et al.	500	46,111	59	5,366
Total final homesteads	1,915	654,015	419	73,504
Deserts	77	12,183	1	160
Public auction	9	1,331		
Mineral	107	7,115		
Miscellaneous	165	4,169	45	3,040
Total final entries, all classes	2,273	678,813	465	76,704
Indian land, as above	465	76,704		
Total	2,738	755,517		

¹ A final entry of public land is one upon which final certificate has issued showing that the law has been complied with and that in the absence of irregularity, the entryman or claimant is entitled to a patent. If the requirements of law have been met, the equitable title to the land passes to the claimant upon the issuance of the final certificate.

Patents Issued and Certifications Having the Effect of Patents Made During the Fiscal Year Ending June 30, 1940 ¹

	Number	Acres
Homesteads:		
Stockraising.....	2, 270	1, 124, 558
Enlarged.....	318	70, 128
Reclamation.....	163	14, 145
Forest.....	55	5, 101
Sec. 2289 et al.....	778	77, 573
Total homestead patents.....	3, 584	1, 291, 605
Deserts.....	85	13, 320
Public auction.....	48	5, 871
Timber and stone.....	4	413
Mineral.....	133	6, 952
Railroad.....	6	10, 138
Special acts.....	164	21, 177, 400
Miscellaneous.....	1, 185	56, 706
Total patents all classes.....	5, 209	2, 562, 405
Certified to States.....		135, 077
Total patents and certifications.....	5, 209	2, 697, 482

¹ Where upon final examination it is found that an entry or selection is in proper form and that the law has been complied with, a patent conveying the legal title to the claimant is issued. In the case of indemnity State selections, the legal title is conveyed upon approval thereof by the Secretary of the Interior and certification by the Commissioner of the General Land Office.

² Includes 793,847 acres of school section land, patented under the act of June 21, 1934 (48 Stat. 1185).

LANDS PATENTED WITH MINERAL RESERVATIONS

The following table shows the areas patented during the year, and the total areas patented to the close of the year, in which minerals in some form have been reserved to the United States:

	Fiscal year	Total
	<i>Acres</i>	<i>Acres</i>
Stockraising Act, all minerals reserved.....	1, 124, 559	32, 834, 116
Other acts:		
All minerals reserved.....	190, 889	946, 053
Coal only reserved.....	11, 106	10, 830, 587
Some named minerals reserved.....	20, 244	1, 823, 312
Total.....	1, 346, 798	46, 434, 068

Summary of Mineral Land Withdrawals and Classifications Outstanding on June 30, 1940

Class	Withdrawn	Classified	Total
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Coal.....	25, 684, 995	¹ 33, 494, 162	59, 179, 157
Oil.....	² 4, 859, 154	71, 884	4, 931, 038
Oil shale.....	5, 989, 949	4, 081, 208	10, 071, 157
Phosphate.....	1, 889, 601	302, 219	2, 191, 820
Potash.....	9, 411, 906		9, 411, 906
Metallie minerals.....	8, 507		8, 507
Total.....	47, 844, 112	37, 949, 473	85, 793, 585

¹ Includes 5,229 acres of coal land reserved for use of the United States (coal reserves Nos. 1 and 2).

² Includes 13,578 acres withdrawn as helium reserve.

THE NATIONAL PARK SERVICE

Arno B. Cammerer, *Director*

LIFE today in the United States of necessity is keyed to national defense. Our national integrity, our land, our ideals will be preserved only so long as we are prepared to defend them to the limit of our abilities. So too with the national resources with which the Nation has been so signally blessed. We must defend them against waste and overuse, against selfish aggression, even against the waste of nonuse.

The far flung Federal park system, which itself must be defended against aggression, plays an important part in the drama of national defense.

In those parks established in memory of great men or great deeds, the scroll of American history may be read. There we may learn of the strength of our pioneer forefathers who braved the little known sea and less known land; of their struggles when all nature, animate and inanimate, seemed against them. There we learn of their fight, and often their death, for an ideal, that it might be translated into epic history.

And in the wilderness parks we have the best of unspoiled nature that the country has to offer. They are the sanctuaries in which protection is given all forms of life. In them survive forests of rare species; lush meadows, free from grazing for two decades; matchless water resources of inestimable value to nearby communities. These possessions must be protected through the trying times ahead.

A distinct contribution to national virility and stamina, essential to any defense program, will be made through use of these parks. By the inherent nature of their activities they preserve morale, promote physical fitness, sanity, and spiritual well-being. Always a safety valve for the stresses and strains of life, and especially so in this machine age, their conditioning effects will be of prime importance in a program of making the Nation physically fit—the first principle of successful national defense.

It even may not be too fantastic to suggest that many recreational areas within the Federal park system will become proving grounds where the youth of the Nation will learn such new maneuvers of pre-



AMERICA, THE BEAUTIFUL.

Middle fork of the Kings River in the new Kings Canyon National Park, California. Established by Act of Congress dated March 4, 1940, this 44,600-acre Sierra wilderness contains some of the wildest and most beautiful scenery in the United States.

paredness as the northern countries have exhibited—the expert use of skis. The enormous increase in public interest already has produced potential legions of ski troops.

The interpretive program of the Service, which each year is made available to several millions of park visitors, may well be accepted as a potent force in maintaining national equilibrium. It is devoutly to be hoped that this program may be augmented rather than retarded. It would be “penny wise and pound foolish” to curtail a service of such proved value at the moment when its stimulation of appreciation and pride in the scenic resources and historic background of the Nation is a material aid in conditioning citizens for defense.

THE YEAR'S HIGH LIGHTS

Nineteen-Forty has been a year of increase in areas in the Federal park system, of expansion of activities, and of wide shifts in personnel planned to build up an administrative staff with a diversified background of park experience.

The signing by President Roosevelt on March 4 of the act to establish the Kings Canyon National Park, Calif., brought to a successful conclusion a 60-year fight to make that wilderness country a part of the national park system. Under the terms of the act the 4 square miles constituting the General Grant National Park, established in 1890, became the General Grant Grove Section of the Kings Canyon National Park. Redwood Mountain, acquired through purchase, was added to the park by Presidential proclamation on June 21. Superlatively wild mountain scenery and some of the finest remaining virgin groves of giant sequoias are the main features of this new park.

Isle Royale National Park, in northern Lake Superior, authorized in 1931, was established on April 5, 1940, with the acceptance by the Secretary of the Interior of title to the last parcels of land to be acquired on the island. This wilderness island, 44 miles in length, and its surrounding islets form a unique archipelagian national park.

The addition of nearly 200,000 acres to the Olympic National Park, Wash., brought into that unit unsurpassed rain forests, hot springs, spectacular waterfalls, other scenic wonders, and new recreational facilities.

Several areas of historic interest were added to the Federal park system. Tuzigoot National Monument, in Arizona, contains prehistoric ruins of great archeological interest and unusual educational value. Chalmette National Historical Park, La., site of the Battle of New Orleans in the War of 1812, absorbed the Chalmette Monument and Grounds Reservation established in 1907. Appomattox, Va., scene of Lee's surrender in the War between the States,

became the Appomattox Court House National Monument. The Custer Battlefield National Cemetery, S. Dak., was transferred to the Federal park system by Executive order of June 3, 1940, the transfer to take place on July 1. Under the Historic Sites Act the Manassas National Battlefield Park in Virginia and the Vanderbilt Mansion at Hyde Park, N. Y., were designated national historic sites. The latter preserves a magnificent example of the type of great estates built by captains of industry in the era that succeeded the War between the States.

Abraham Lincoln's birthplace, in Kentucky, formerly classified as a national park, was designated the Abraham Lincoln National Historical Park, and Fort McHenry National Park in Maryland was given the more appropriate status of national monument and shrine.

Establishment of new park areas and changes in boundaries brought the total number of units in the Federal park system to 161, with a total area of 21,550,783 acres.

A total of 15,454,367 persons visited the Federal park areas during the travel year ended September 30, 1939. Through June 30, 1940, the travel for the year beginning last October 1 was approximately 500,000 ahead of the same period a year ago. Winter sport activities increased in popular favor, with resultant increase in the winter visitation.

Preservation of historic Cumberland Gap, in Virginia, Kentucky, and Tennessee, was authorized by Congress, with the proviso that the lands within the approved boundaries be donated to the United States. This has been the basis of practically all recent park establishment involving areas wholly or partially privately owned.

Excellent progress is being made on the Blue Ridge Parkway, with the prospect of more than 300 miles of scenic roadway, free of billboards and roadside stands to be completed or under construction during the 1940 season. Opening of the tourist season this spring found a continuous stretch of 140 miles between Adney Gap, Va., and the North Carolina State line opened to use for the first time. Another stretch of 50 miles between Grandfather Mountain and Mount Mitchell, both in the North Carolina section of the parkway, was opened on a "travel at your own risk" basis. Invitations to bid for concessions to operate motor service and eating facilities on the Blue Ridge Parkway were issued.

Three sections of the Natchez Trace Parkway, totaling 36 miles in Mississippi, were graded and surfaced. Another section of 11 miles in that State was graded and 29 additional miles were under construction at the close of the year. In Tennessee 9 miles are under

construction. Survey and location work was carried on in Alabama, Mississippi, and Tennessee.

Shenandoah's Skyline Drive, which is an integral part of the greater parkway connecting and passing through Shenandoah and Great Smoky Mountains National Parks, was completed and opened to travel.

In view of the dissimilarity between the National Capital Parks system and other park systems throughout the country, both national and municipal, the Secretary of the Interior requested that a joint study of the park system of the District of Columbia be made by Capt. Charles G. Sauers, general superintendent of the Cook County Forest Preserve of Illinois, and Mr. H. S. Wagner, director-secretary of the Akron Metropolitan Park District, Ohio. Following submission of their report, a civil-service examination was held to develop a register of eligibles for the position of superintendent of the National Capital Parks.

Wildlife research activities of the National Park Service on January 1 were transferred to the Bureau of Biological Survey, which immediately reassigned the personnel engaged thereon to National Park Service duties. Improvement of wildlife range conditions continued to be the chief wildlife management activity in the Federal park system.

A training school in recreational leadership, similar to the Yosemite School of Field Natural History, was inaugurated at Swift Creek Recreational Demonstration Area, Virginia.

A P. W. A. project permitted continuation of the Historic American Buildings Survey, through which the Service is helping to preserve the plans and photographs of structures that played a significant part in our historic past, or that are of importance in denoting a particular phase of the country's architectural development. A small staff working from four strategically located cities provided the most workable organization yet assembled for carrying on the survey.

Engineering research resulted in the development of a new type of radio antenna for park ranger patrol cars which created nationwide interest, especially among Federal and State agencies, many of which desire to take advantage of the results. Work now in process promises development of a compact, ultra-high-frequency radio field set which bids fair to surpass anything heretofore available in this line.

Airplane patrols supplemented the customary dog-sled method in Mount McKinley National Park, Alaska, making it possible to cover in 3½ hours territory that would require 4 weeks to patrol by dog team.

The fire-protection statistics accumulated during the past 10 years proved of value in facilitating improved protection, and new fire lookouts improved the forest-fire detection systems.

Advance of the white-pine blister rust to the sugar-pine forests of California has created a formidable problem. Control activities have been planned by the various agencies involved, but sufficient funds to make them effective are not available. At present this problem ranks next in importance to fire in forest protection in the national parks.

Public interest in all phases of national parks resulted in an all-time high in informational work through every recognized channel—radio, press, and magazine publicity, information circulars, lectures, picture distribution, and extension service. The free fall and winter lecture service was given to capacity audiences, frequently with an overflow of several hundred disappointed persons. The monthly series of articles on the four-hundredth anniversary of Coronado received world-wide distribution through several media.

Passage of the act to establish the United States Travel Bureau was assured as the fiscal year came to a close. Passed by both Houses of Congress, it awaited Presidential approval (which was affixed July 10). The Bureau further consolidated its position as the coordinating agency for public and private organizations concerned with the development of recreational travel. Pending appropriation of the authorized funds, it continued to operate under emergency financing.

With a quota of 310 continental C. C. C. camps, the Service continued its broad program of conservation and recreation development on 90 national parks and monuments, 22 recreational demonstration areas, and 198 State, county, and metropolitan parks. Camps were established for the first time in the Badlands (S. Dak.) and Chaco Canyon (N. Mex.) National Monuments, Saratoga (N. Y.) National Historical Park project, and Kings Canyon (Calif.) National Park. C. C. C. camps in Hawaii and the Virgin Islands, authorized for 675 enrollees on 5 projects, operated solely under the jurisdiction of the National Park Service.

The Service is cooperating with the Philippine Commonwealth and the Territory of Hawaii by detailing park planners to make studies of national park possibilities on those islands. Following a study of the national parks of the United States by a committee of officials from the Philippines and a request from President Quezon, the National Park Service detailed Louis P. Croft to the islands as adviser on national parks. He will assist in the survey of park possibilities and draft plans for improvement of existing parks. Merel Sager was detailed for 6 months to assist the Territorial Planning

Board, Territory of Hawaii, in the study of potential recreational areas and activities.

In cooperation with the Reclamation Service and the Lower Colorado River Authority, and financed with P. W. A. funds, a comprehensive study was begun on recreational possibilities along the impounded waters of the Colorado River, Tex.

The work of the Safety Committee of the Service in the preparation of safe practice standards and of the safety committees organized in the Federal parks has been effective in reducing compensation costs. From 1936 to 1938 the reduction in such costs was 45.7 percent. Preliminary figures of the United States Employees' Compensation Commission for 1939 indicate a further substantial reduction in compensation payments for injuries.

The National Park Service continued its participation in the leadership of the Federal Interdepartmental Safety Council through representation on the Executive Committee of the Council.

Field studies were accomplished in many of the parks on telephone, electric, and water services furnished by the Government. These cover the planning for new telephone systems and the recommending of improvements in existing systems; operation studies of electric and water systems for determination of rates to be charged for services and recommended improvements.

"A Study of the National Recreation Problem," the first Nation-wide report on the Park, Parkway, and Recreational Area Study, was completed during the year. In addition, State reports were completed in Arkansas, Florida, Maine, Massachusetts, New Mexico, Texas, Rhode Island, and Washington, making a total of 30 State reports completed to date. Special reports on organized camping were prepared for California, Georgia, Ohio, and South Carolina. Bills authorizing a survey to determine a suitable route for a national Mississippi River Parkway were introduced in both Houses of Congress last year and are still pending; meanwhile, legislation has been enacted in Arkansas, Illinois, Kentucky, Mississippi, Missouri, and Wisconsin enabling these States to cooperate with the Federal Government in the planning of such a parkway.

Amicable State relationships were continued and the administrative machinery of a number of States strengthened as a result of Service suggestions for careful, regularly revised master planning, and proper protection and maintenance of areas developed with C. C. C. funds.

Under a cooperative agreement with Work Projects Administration, the Service continued its review of applications submitted to the W. P. A. for work on park and recreation areas.

The subject of fee charges by the Federal Government in various park areas was studied and new fees subsequently established.

A Nation-wide study was made of fees and charges for public recreation services in park areas of various types throughout the country and report thereon made to the American Institute of Park Executives.

The trust fund administered by the Service's trust fund board now amounts to \$14,817.05. Annual interest on investments increased the fund in 1940 by \$343.56.

A conference of national park superintendents and other ranking administrative field officers, with key officials of the Washington office staff, was held in Santa Fe, N. Mex., October 2 to 9, 1939. Among the subjects discussed were studies of adjustments in field and park organizations and personnel necessary to keep abreast of the rapid expansion of the Service; an analysis of the broad field of fees and revenues; accommodations for the public with especial reference to lower-priced cabin and housekeeping types of service; youth hostels and their adaptability to the National Park Service recreational program; and a review of interpretive programs designed to aid in visitor enjoyment.

The operators of concessions furnishing accommodations for visitors to the national parks met in Washington in November 1939. These meetings are held periodically to insure close collaboration with the Service in maintaining high standards of service. Other conferences held in Washington were those of the regional directors, the regional engineers, and regional foresters, all in February 1940; and in the same month a meeting of Southwestern National Monuments custodians at Casa Grande National Monument, Ariz., headquarters of the Southwestern group.

These conferences provide excellent media for inculcation of park ideals in newer members of the Service and for that exchange of ideas and explanation of policies so essential to the morale and smooth functioning of a farflung organization.

With deep sorrow is recorded the death of Frank Pinkley, Superintendent of Southwestern National Monuments, last February.

REGIONALIZATION INCREASINGLY EFFECTIVE

Each year the effectiveness of the regionalization program becomes more apparent. The four regional offices, as liaison agencies between the park areas and the Washington Office, assisted actively in developmental, planning, and investigational enterprises in connection with Federal parks and State, county, and metropolitan areas. Activities on non-Federal areas resulted in Service cooperation with practically each State in the Union. Comprehensive land-use planning was furthered by Service participation, through the regional offices, in drain-

age basin activities, and the preparation of land analyses of the Park, Parkway, and Recreational Area Study.

Consultation service was rendered Federal and State agencies and private associations in various phases of park and recreational work, including treatment and interpretation of historic sites and assistance given non-Federal agencies in the initiation of leadership programs. Through their contacts with outdoor clubs, conservation organizations, State officials, and allied groups, the regions kept the Service conversant with developments and trends in the field of parks, recreation, and conservation generally.

UNITED STATES TRAVEL BUREAU APPROVED BY CONGRESS

As the fiscal year came to a close, passage was assured of H. R. 6884, "To encourage travel within the United States," as the bill had then passed both Houses of Congress. The President approved the act on July 19, 1940. Thus, for the first time since its establishment in 1937, permanent existence of the Bureau was assured and long-range planning made practicable. Estimates of appropriations required to carry on the work of the Bureau during 1941 under this congressional authority have been forwarded to the Bureau of the Budget. Meanwhile financing was continued under emergency appropriations.

Throughout the year the Travel Bureau further consolidated its position as the coordinating agency for public and private organizations concerned with the development of recreational travel. The program touched increasingly on all aspects of the travel situation, including its development, its promotion, its significance, and the intricate problems involved in its handling.

An example of the Bureau's value as a coordinating agency was provided by President Roosevelt's proclamation declaring 1940 to be Travel America Year. The proclamation was instigated by the Bureau and used by the travel industry as the spearhead of a great Travel America movement.

A 5-year tabulation of the retail expenditures of recreational travelers in the United States was completed, revealing that they rose 26 percent from 1935 to 1939 and total the enormous sum of \$26,000,000,000 for the 5-year period.

The monthly Official Bulletin of the Travel Bureau now goes out to a request list of almost 7,500 individuals and organizations who have come to regard it as the authoritative source of basic information and data on developments within the industry. Another informational service was added—the semiannual calendar of events, listing the nature and date of events of interest to tourists through-

out the country. A directory of Negro hotels was compiled and facilities were arranged with transportation and accommodation services throughout the country for the convenience of Negro travelers. A descriptive poster list was published showing the number and variety of display posters available for use by various groups in travel displays.

The Bureau has consistently stressed the safety, the value, and the need for greater inter-American travel. This has played an important part in the greatly expanded travel between the American continents. Plans were laid during the year to increase this kind of work.

THE PARK, PARKWAY, AND RECREATIONAL AREA STUDY

The Nation-wide Park, Parkway, and Recreational Area Study being conducted by the Service in cooperation with the States is proceeding with the planned program as a continuing activity.

Reports on State-wide recreation plans and programs have been prepared in Arkansas, Florida, Maine, Massachusetts, New Mexico, Texas, Rhode Island, and Washington, making a total of 30 State reports completed to date. Work has been continued on other phases of the Recreation Study, including the investigation and appraisal of existing and potential areas, the study of recreational resources and such special activities as organized camping, leading toward the formulation of more complete and comprehensive programs. Reports on organized camping have been prepared in California, Georgia, Ohio, and South Carolina.

The Service's first Nation-wide report, *A Study of the National Recreation Problem*, is now being published at the Government Printing Office. This report is based to a considerable extent upon the information collected through the State studies, and will furnish the framework for a coordinated and unified national recreational plan.

An important outgrowth of the recreation study is the coordinated effort of the States along the Mississippi River in the planning for a national parkway following the general course of the River from its source in Minnesota to the Gulf of Mexico. Arkansas, Illinois, Kentucky, Mississippi, Missouri, and Wisconsin have enacted legislation enabling them to cooperate with the Federal Government in the planning and development of such a parkway. The Iowa and Minnesota Legislatures have passed resolutions endorsing the project. Bills authorizing a survey to determine a suitable route for a national Mississippi River Parkway were introduced in both Houses of Congress last year and are still pending.

STATE RELATIONSHIPS

The National Park Service continued its relationship with the States and many political subdivisions, principally through its joint participation with them in supervision of Civilian Conservation Corps work on their park and recreation areas. Increasingly the States which have recently entered the park field are assuming responsibilities which are rightfully theirs, chiefly by a greater degree of participation in planning and by contributions to the costs of adequate development, no longer feasible with C. C. C. funds alone in areas where remaining work is largely of construction character.

These non-Federal agencies have been helped materially by the Service's suggestions for careful and regularly revised master planning of their properties and by the searching review accorded their plans by Service technicians. At the same time, insistence that areas developed by C. C. C. funds be properly protected and maintained has been an influence in strengthening their administrative machinery. Since continuance of Federal assistance is conditioned on such protection and maintenance, field representatives frequently view and report on the manner in which it is provided.

Though inadequately staffed for the purpose, the Service, under a cooperative agreement with W. P. A., reviewed and advised on approximately \$100,000,000 worth of park and recreation applications submitted to W. P. A. during the past year.

USE AND DEVELOPMENT OF HISTORIC AREAS

Conservation of the historical areas is an obligation of the National Park Service which assumes increased significance in the present necessity for national defense. This theme is vividly dramatized at such areas as the Statue of Liberty, New York Harbor, Colonial National Historical Park, Va., the Saratoga National Historical Park Project, N. Y., and Fort McHenry National Monument and Historic Shrine, Md. An attendance of 7,000,000 at our national historical parks and monuments, recruited from the 48 States and many foreign lands, was accompanied by interpretations by ranger historians of the part these areas played in the American way of life, and the place accorded them by historians and military experts.

Saratoga National Historical Park Project, New York, turning point of the American Revolution, is now being developed, through Civilian Conservation Corps cooperation, in a manner commensurate with its far-reaching importance.

The Statue of Liberty National Monument, in New York Harbor, was visited by 428,000 people.

Intensified interpretive programs at Colonial National Historical Park, Va., and Morristown National Historical Park, N. J., strike the keynote that makes every visitor conscious of America's rich heritage. Similar inspiration attended the special celebration held at Fort McHenry National Monument and Historic Shrine, Md., birthplace of the Star Spangled Banner.

Pan-American interest has been focused on the Southwest, where the National Park Service has been cooperating with the Coronado Cuarto Centennial Commission in celebrating the four-hundredth anniversary of Coronado's explorations. An international monument has been proposed at the approximate location where Coronado entered what is now the United States. In the Southeast a Pan-American center has been considered by the city of St. Augustine, Fla., and the cooperation of the Carnegie Institution and the National Park Service has been solicited in the development of this center.

Perry's Victory and International Peace Memorial, Ohio, which commemorates Perry's victory in the battle of Lake Erie, on September 10, 1813, and more than 120 years of peace and friendship between Canada and the United States, was reopened to the public upon completion of repairs to the elevator.

At the Statue of Liberty National Monument, the unsightly red brick barracks buildings have been demolished through the aid of the W. P. A. With P. W. A. funds an administration building of grey stone, harmonizing with the statue itself, is being erected. Plans for the landscaping of the area have been completed.

At Morristown National Historical Park, N. J., where the flicker of liberty was kept burning by Washington and his troops during the bitterly cold winter of 1779-80, the Ford Mansion occupied by Washington has been rehabilitated. The rotted beams in the ceilings and walls have been replaced with solid timbers. Modern floors have been replaced by floors simulating the original flooring. The house is being furnished as of the period when General and Mrs. Washington made this building their home.

At Salem Maritime National Historic Site, Mass., where the historical interest centers on early United States shipping, the reconstruction of Derby Wharf and Central Wharf has been completed. The Derby House, once the home of the well-known merchant, Elias Hasket Derby, owner of the *Grand Turk* and other famous American ships, was repainted.

At Homestead National Monument, Nebr., which commemorates a significant chapter in Federal land policy and American westward expansion, native grasses and shrubs were planted to give the area an appearance similar to that which it possessed when Daniel

Freeman during the early hours of January 1, 1863, filed the first claim made under the homestead law.

At Fort Laramie National Monument, Wyo., the historic officers' quarters known as Old Bedlam were reroofed and the porch restored. The cavalry building was resingled, and to prevent further deterioration of the Sutler's Store, stabilization of its foundation was undertaken. This area, located on one of the main traveled routes to the Northwest, played an important role during the fur-trading era and the Oregon migration.

Notable progress was made in archeological work. At Jamestown, Va., the foundation of one of the earliest brick structures in the United States was excavated and a large part of the seventeenth century shore line of the island was determined. At Ocmulgee National Monument, Ga., two units of the museum building were completed to house and display the extensive collection of Southeast artifacts excavated during the period 1933-39.

To preserve the homes of prehistoric Indians in the Southwest, important ruin stabilization projects were undertaken at Chaco Canyon National Monument, N. Mex., Inscription House in Navajo National Monument, Ariz., Bandelier, N. Mex., Aztec Ruins, N. Mex., and Walnut Canyon, Ariz., National Monuments. Some of this work was undertaken by an Indian C. C. C. mobile unit consisting of Navajo enrollees under the direction of a competent archeologist.

Significant progress was made in the development of Hopewell Village, National Historic Site, Pa., which commemorates an important phase of industrial development in this country; namely, iron manufacturing. The walls of the old blast furnace at this area have been stabilized. The mill race, supplying water to operate the waterwheel at the furnace, has been traced by archeological investigation.

At the Saratoga National Historical Park Project, N. Y., where the English under Burgoyne were defeated by the Americans under General Gates, and which proved to be the turning point in the American Revolution, a C. C. C. camp has been actively engaged in the removal of nonhistoric features, such as modern fences and farm buildings.

The National Park Service and the C. C. C. cooperated in developing the following State park areas which are historical or archeological in character: Fort Morgan State Park, Ala.; Fort Clinch State Park, Fla.; Mound State Park, Ala.; New Salem State Park, Ill.; Illinois and Michigan Canal State Park, Ill.; Custer State Park, S. Dak.; De Mores State Park, N. Dak.; University Ruin, Tucson, Ariz.; Goliad State Park, Tex.; La Purisima State Historical Monument, Calif.; San Juan Baptista State Historical Monument, Calif.; Shelby Negro State Park, Tenn.; Fort Griffin State Park, Tex.

HISTORIC AND ARCHEOLOGIC SITES SURVEY

The Nation-wide Historic Sites Survey is proceeding according to a chronological thematic program. Reports on seventeenth and eighteenth century French and Spanish sites, and Colonial Dutch and Swedish sites have been completed. In the field of archeology a preliminary report on Early Man in North America, a preliminary report on Prehistoric Sedentary Agricultural groups, and a final report on Historic Sedentary Agricultural groups were prepared. The prehistoric and historic sedentary agricultural groups include many large and spectacular sites belonging to the mound builder and pueblo type civilizations. This class of remains suffers most from relic hunters and the elements and therefore has received primary consideration.

The Historic Sites Survey is laying the basis for a broadened concept and keener understanding of this country's past. The establishment of a classified list of significant sites will focus the attention of individuals, organizations, and Federal and State agencies in preserving and using them.

The National Park Service has worked cooperatively on a survey of archeological areas with Harvard, Columbia, Michigan, Louisiana, Tennessee, Alabama, and Georgia Universities.

HISTORIC AMERICAN BUILDINGS SURVEY

Pursuing the national plan sponsored by the Department of the Interior, through a three-party agreement between the National Park Service, the Library of Congress, and the American Institute of Architects, the Historic American Buildings Survey added substantially to the permanent graphic record of noteworthy examples of architecture erected in the United States and possessions prior to the last quarter of the nineteenth century. A unit was established in Washington to coordinate both Federal and State measuring groups. Four field units were established to work out of Boston, Richmond, St. Louis, and Santa Fe.

The Survey succeeded in recording by emergency surveys a number of valuable structures threatened with destruction. Supervisory cooperation with a number of State W.P.A. recording projects was continued.

The Historic American Buildings Survey Collection in the Fine Arts Division of the Library of Congress included more than 18,600 measured drawings and 20,200 architectural photographs, which are in frequent use by architects, archeologists, historians, students, and libraries.

MEMORIALS

Jefferson National Expansion Memorial, St. Louis, Mo.—By June 30, 1940, negotiations were completed for acquiring 397 of the 483 separate parcels of real estate comprising the area of this memorial, at an aggregate cost of \$4,656,318. Of these, 390 parcels were acquired through negotiations and agreements with the owners and 7 parcels were acquired through condemnation. The amounts paid totaled \$471,396 less than the aggregate awards of the Court Commissioners appointed by the Federal court to report on values of these properties.

On July 1, 1940, agreements covering 86 parcels of land remained to be reached, on which the aggregate of awards by the Court Commissioners is \$1,894,945, and the amount paid into the court with the Declarations of Taking is \$1,638,474.

When title to the area became vested in the United States there were 203 occupied buildings to be evacuated. By January 1, 1940, only 116 buildings remained occupied. On June 30, only one property remained occupied, and the owner of that, a large manufacturing company, had a new plant well along in construction. At the close of the fiscal year, wrecking operations were 40 percent completed.

Mount Rushmore National Memorial, S. Dak.—Under the President's Second Reorganization Plan the Mount Rushmore National Memorial was again placed under the administration of the National Park Service. Following inspection of the area around the memorial, preliminary plans were made for a permanent administrative and operating establishment to be maintained by the National Park Service when the memorial carving has been completed.

The National Park Service cooperated with the Mount Rushmore National Memorial Commission in preparation of a map showing the boundaries of the 1,500-acre tract established by act of Congress, approved June 15, 1938, as the memorial area. This was increased to 1,800 acres by the act of May 22, 1940, and the Service has initiated steps looking to the preparation of a map covering this larger area.

Thomas Jefferson Memorial, Washington, D. C.—At the close of the fiscal year the walls of Washington's Thomas Jefferson Memorial were practically finished and 45 of the total of 54 columns were in place. The erection of the dome also was well under way and the memorial as a whole about 66 percent completed.

Mr. Lee Lawrie was selected in the competition held by the Thomas Jefferson Memorial Commission to carve the figure of Thomas Jefferson to be placed in the memorial.

INTERPRETIVE SERVICE AND SCIENTIFIC RESEARCH

The National Park Service is so advantageously situated in the Federal scheme of conservation and public education that it plays a vital part in stabilizing the thinking of the American citizen. The bulwark of strength in preserving national traditions rests in the intelligence and appreciative understanding of the American citizen. Some 16 million of those American citizens visited the national park areas of the United States in the 1939 travel year. Undoubtedly, the number will be greater this year.

Public appreciation of things American was promoted in the scenic national parks and monuments through the interpretational facilities offered by 34 park naturalists and 107 ranger-naturalists employed on a seasonal basis. The naturalists are supported by a corps of specialists in the various branches of the natural sciences and receive the cooperation of a staff of exhibit designers and preparators who fabricate the exhibits which are an important part of the interpretational program. Other visual aids consist of motion and still pictures of park features which have been made in natural color.

Through radio programs broadcast from eight stations, naturalists interested the public in the cause of conservation. Two of the programs were directed toward juvenile education. In Rocky Mountain National Park, Colo., the naturalist conducted a group of school children on the trails and by means of a traveling microphone broadcast over a national network the story of the park and a quiz of the children. Another program was instituted in the National Capital Parks, District of Columbia, where selected children were taken on nature walks prior to their schoolroom broadcasts in which they were questioned regarding their experiences on the trail.

NATURALIST TRAINING

In order to insure a supply of trained personnel for the seasonal staff and to assist those who wish to qualify for permanent positions, the training programs of the Yosemite School of Field Natural History and the Yosemite Junior Nature School were continued. Both are nonprofit organizations, the former requiring a college degree as entrance prerequisite and the latter admitting children. A training school in recreational leadership was also inaugurated in the East at Swift Creek Recreational Demonstration Area near Richmond, Va. Here the work is directed by recreational specialists with scientists cooperating in offering instruction. These schools opened the 1940 season under promise of success.

Yale University again granted two graduate fellowships to Service employees, affording an opportunity to the recipients to pursue courses of study designed to make their services in the parks more valuable.

PROGRESS IN RESEARCH

Much was accomplished in research in the biological and geological fields. In the former the emphasis was placed on studies to maintain the natural balance between species both of plants and animals. The most pressing have been concerned with the wolf-sheep-caribou relations in Alaska, the bighorn-burro relations in Death Valley, Calif., and the coyote problem in several areas. Of equal importance, although of less spectacular nature, are the censuses of wildlife which are made seasonally. In virtually all of the areas having naturalist services there is a consistent effort to add to the herbaria of the park and to complete the faunal and geological collections which serve as study and reference material for both the visitors and the park staff.

Geological research for interpretive purposes has been varied. Observations were made on the following long-term projects: the annual glacier measurements to determine the changes in the ice caps in the western mountains; the thermal observations at Yellowstone which throw light on the behavior of the geysers; the earth-tremor recordings at Lassen, Volcanic, and Hawaii National Parks, which are useful in interpreting volcanic activity, and at Boulder Dam, Nev., for the purpose of appraising the adjustment of the rocks to the increasing weight of Lake Mead.

A spectacular culmination of the recording of microscopic earth movements and other volcanic phenomena was furnished by the eruption of Mauna Loa in Hawaii National Park. The eruption had been forecast by Dr. Jaggar for several years, as a result of his studies in the Hawaii Volcanic Laboratory, the warnings becoming more specific as the indications became more diagnostic. The activity of the volcano has been closely observed, gases have been collected, and its performance correlated with past records.

The use of the parks by schools and colleges to supplement winter term courses in the natural sciences is again worthy of notice, 89 study and research groups having visited these areas.

Much scientific and informative material was recorded in the technical reports of the staff. A number of these were printed in scientific or organization journals, others appeared as publications of the Natural History Associations, and still others are awaiting funds for printing.

CONSERVATION IN PARK DEVELOPMENT

A noteworthy conservation effort was initiated at Platt National Park, Okla. This park is situated in an artesian basin which has been notable from prehistoric times for the qualities of its mineral water, among them the only known bromide springs. A study showed that unrestricted flow from wells drilled nearby for therapeutic or exhibition uses has resulted in a loss of 80 percent of the natural flow. The Service has sponsored cooperative action on the part of local developers outside the park to conserve the water so it will be permanently available.

The core drill has been active in Region 1 in developing water for Federal and State parks and forests. Areas were studied, locations chosen, and 18 successful wells developed. The drill was used also to test dam sites, obtain soil samples for scientific study, and to grout dam foundations in 5 additional projects.

Pursuant to the Service policy of excluding areas from park and monument boundaries in which mineral deposits of economic value occur, investigations were made of six areas. Boundary adjustments or special regulations were proposed in those cases where a conflict between economic and recreational interests might develop. Many other developmental activities were aided through the advice of staff scientists on the technical aspects of the planning and accomplishment of these projects.

MUSEUMS

The Service's visual education activities were conducted during the year in more than 100 museums, where the recorded visitation numbered nearly four million, and some 25 trailside exhibits.

Museum planning for the Jefferson National Expansion Memorial in St. Louis, Mo., was the largest single activity of the year. Intensive studies were completed for approximately two-thirds of the major divisions of the national expansion story. Reports on the Role of the Indian in National Expansion and A Preliminary Bibliography on the American Fur Trade were mimeographed to facilitate curatorial work. In addition, specific information was gathered for current use in the museum laboratory. During the year the laboratory continued to produce exhibits to be installed in a temporary museum on the memorial site. Among those now in process of preparation is a scale model of the basic museum facilities desired for the memorial.

A complete museum installation was made during the year in the new adobe building at White Sands National Monument, N. Mex. The exhibits relate chiefly to the geology and ecology of the gypsum dunes of the vicinity and also touch upon local ethnology and history.

Archeological interests in southeastern United States centered around Ocmulgee National Monument near Macon, Ga., where plans were completed for a museum to interpret the ancient Indian civilizations which flourished in that vicinity prior to the advent of the white man and in early historic times as revealed by the prehistoric mounds, elaborate fortification system, ceremonial earth lodge, cultivated field, ancient trading post, and burial mounds located on the area. A modern building is now under construction to house the museum exhibits.

Exhibit plans were approved for four museums; general museum development plans were approved for two areas; and several additional development plans were completed and are ready for review and approval.

Existing exhibits in more than 20 museums were either revised or increased. The Western Museum Laboratories also distributed among the parks an array of miscellaneous products designed to aid the park interpretive work. Among the major items were some 3,500 reprint holders; 5,000 pamphlet binders; 16 herbarium, geology, study skin, and insect cases; 5 museum cases; 3,800 silk screen posters; 2,449 metal trail labels.

Dioramas, paintings, models, and photographs were displayed at 12 fairs, conventions, and expositions. A large number of exhibits were also supplied to the United States Travel Bureau for display at similar assemblages throughout the United States.

WILDLIFE STUDIES

Wildlife research on areas in the national park system during the past fiscal year was performed by two agencies. Prior to January 1, 1940, it was undertaken by the National Park Service through its Wildlife Division of the Branch of Research and Information. After that date, at the direction of the Secretary of the Interior, all wildlife research was transferred to the Bureau of Biological Survey, which reassigned the entire staff to National Park Service duties and set it up as a Section on National Park Wildlife in the Division of Wildlife Research. The work of the Section is integrated with the broad program of the National Park Service through the Branch of Research and Information of that bureau. In the following report, all research is reported without segregation, since practically all projects continued throughout the year, and the transfer involved no change of policy.

Prey-predator ecology continued to be the major research project. Field work is now centered upon the wolf-sheep problem in Mount McKinley National Park, Alaska.

In October 1939, a closer coordination between all research agencies working on bighorn in the Rocky Mountains was effected through an agreement between the National Park Service, the Bureau of Biological Survey, the Forest Service, and the States concerned. A consequent improvement in assembling and distributing data results in more efficient efforts to conserve this endangered species. The National Park Service contribution to this cooperation has come from Rocky Mountain National Park, Colo., where studies on dietary and mineral requirements of bighorn are in progress; from Yellowstone National Park, Wyo., where migration and range are being studied by the naturalist staff; and from Glacier National Park, Mont., where the Regional Biologist and park staff are studying lambing range requirements and improvement. Inventories in Death Valley National Monument, Calif., show a gradual improvement in the status of Nelson bighorn, but indicate a need for elimination of feral burros. Similar range competition is found to be imminent at Boulder Dam National Recreational Area, Nev. Studies in Organ Pipe Cactus National Monument, Ariz., show that distribution of water holes may be the present limiting factor in conservation there of the Gaillard bighorn.

Other inventories include a survey of the botanical resources of Mount McKinley National Park, Alaska, through cooperation of the Universities of Wyoming and Alaska; a preliminary survey of wildlife at the new Channel Islands National Monument; and similar work at Capitol Reef, Utah, and Joshua Tree, Calif., National Monuments.

Additional research projects included a study of mosquito control methods in the southeastern United States, resulting in recommendation of pyrethrum as a deterrent, rather than fuel oil; studies of reported overpopulations of deer at Hickory Run Recreational Demonstration Area, Pa.; and of deer, turkeys, and raccoon at Colonial National Historical Park, Va.; appraisal of wildlife habitats along the Blue Ridge Parkway; study of mixed-type habitats versus solid forests in southeastern areas; continuance of the Yellowstone trumpeter swan studies; and study in Rocky Mountain National Park of forage utilization by elk, deer, bighorn, and beaver.

During the past year improvements in making and recording the annual wildlife inventories in the various parks have made such data more usable in various management and publicity projects.

WILDLIFE MANAGEMENT

Improvement of range conditions through regulation of large herbivorous species and through reductions in grazing of domestic stock has continued to be the chief wildlife management activity in the national park system. In Wind Cave, S. Dak., and Platt, Okla.,

National Parks the buffalo herds were reduced, chiefly through disposal to Indians, to the carrying capacities of the respective ranges. At Wind Cave efforts are also being made to effect some reduction in the elk herd of 130 head by transfer to the adjacent State game preserve.

Grazing conditions at Olympic National Park, Wash., were improved by a herd reduction of about 500 elk, legally killed from among those migrating outside the park. A similar method of reduction was last fall authorized east of Rocky Mountain National Park; and tentative arrangements have been made with the Montana Game Commission to adopt such a practice with surplus elk that annually move outside Glacier National Park. The Yellowstone elk reduction program was practically suspended this year by a very mild winter, but fortunately for the range the same climatic condition permitted most of the elk to remain above the winter range, and favored good growth of vegetation to counteract the slight herd reduction of but 122, legally killed outside the park, and 16 live-shipped for restocking.

Improvement in ranges overstocked with deer continued satisfactorily. In Zion National Park, Utah, a shipment of 62 animals to understocked areas elsewhere resulted in marked improvement of both range and deer inside the park. In Pennsylvania areas overbrowsing will be corrected or prevented by a recent agreement, approved by the Secretary of the Interior, whereby the National Park Service and the Pennsylvania Game Commission will cooperate on regulated hunting in such recreational demonstration areas in that State as require management measures to preserve recreational values. Overabundance of deer in Colonial National Historical Park is being corrected by cooperation with the State of Virginia to the end that surplus animals will be trapped and planted in understocked parts of that State.

THE REDUCTION OF GRAZING BY DOMESTIC STOCK

Notable progress has been made in several national parks and monuments. Through an agreement between the National Park Service and the Grazing Service, approved by the Secretary on February 20, 1940, grazing privileges at the Carlsbad (N. Mex.) Caverns National Park addition; Grand Canyon (Ariz.) and Zion National Monuments; and Dinosaur (Utah) National Monument addition are being expeditiously handled by field men of both Services on a basis of gradual reduction and eventual elimination of grazing. Areas adjacent to forest reserves, such as Bryce Canyon (Utah) and Kings Canyon (Calif.) National Parks, are receiving similar "tapering off" management by the National Park Service. Other grazing projects include eventual removal of saddle horses from a bighorn lambing ground in Glacier National Park; removal of stray cattle and

burros from important bighorn ranges in Death Valley National Monument; and improvement of waterholes for antelope at White Sands (N. Mex.) National Monument.

The perennial bear-visitor problem became less acute during the past year, as educational work was increased at campfire lectures, on guided trips, by radio, public press, and posters. Through all these media the public may be eventually more appreciative of bears in natural surroundings, in contrast to the "bear shows," and more co-operative in following the recently strengthened regulations against feeding or molesting the bears. In addition, the park officials have been increasingly vigilant in the prompt elimination of dangerous bears. Steps have also been taken to minimize one of the two remaining bear shows that are still conducted in the parks. As a result of these efforts there has been a definite drop in the number of bear injuries.

Other management projects include mosquito control on Service areas in the southeast; porcupine control in a restricted public-use area at Black Canyon of the Gunnison (Colo.) National Monument; and boundary adjustments between Lava Beds (Calif.) National Monument and Tule Lake Migratory Waterfowl Refuge to permit more effective administration of both.

FISH CONSERVATION

The principal activities in this field were transferred by direction of the Secretary of the Interior to the Bureau of Fisheries at the same time wildlife research was transferred to the Bureau of Biological Survey. As of June 30, 1940, the President's Reorganization Plan No. 4 placed both these activities in the one bureau, designated as the Fish and Wildlife Service. Following the first action, the new hatchery at Glacier National Park was shifted to the Bureau of Fisheries, and a working agreement for fisheries in all park areas was approved by the Secretary of the Interior on June 7, 1940. Hatchery and research activities will be the function of the Bureau of Fisheries, while planting, law enforcement, and policy recommendation remain with the National Park Service.

Heavy fish plantings, in accordance with scientific plans, continued this year to assure maintenance of the national park standard for excellent fishing. Over 14,000,000 trout and grayling will be planted in Yellowstone alone during 1940. Hatching and rearing facilities have been improved at Sequoia and Glacier National Parks, and improvements in egg-collecting stations were made at Yosemite and Yellowstone. Great care was given in all park areas to the drafting of regulations conducive to maximum conservation. Special attention

was given to many other problems, including further cooperation with State fish commissions at Boulder Dam, at Olympic, and in many small eastern areas; study of a *saprolygnia* infection on silver salmon in Crater Lake; stream improvement to correct damage by road construction in Great Smoky Mountains National Park; and studies upon which to base improved fishing in numerous State parks and recreational demonstration areas.

INFORMATION SERVICE

Information concerning the National Park Service and its activities was disseminated to a world-wide audience through various accepted media of distribution, including the press, radio, illustrated lectures, printed and processed literature, and picture service. In addition to prepared statements to the press on matters of current interest, material was furnished upon request to newspaper and magazine feature writers, and several monthly services on specialized subjects were issued to selected groups indicating interest therein. Cooperation was also maintained with patriotic societies, civic and conservation organizations, study clubs, schools, and allied groups.

NEW PRINTING PROCEDURE FOR PARK LITERATURE

An innovation in the Service printing program was the authorization by the Congressional Joint Committee to print its circulars of general information commercially in the field. In the initiation of this program it was necessary to work out a plan of uniform procedure pertaining to printing and fiscal requirements. Through contracts awarded five printing firms in different sections, 1,902,000 booklets and folders were issued, ranging in editions from 22,000 to 200,000 copies for individual park areas. The inauguration of the field printing program proved highly successful, resulting in lessening both the time and cost of production of the publications.

In addition to this private printing, the series of informational bulletins on historic areas started last year was augmented by 16 new booklets. A new series of inexpensive sales publications, entitled the "National Park Service Popular Study Series," has been planned. This series, in popular style, will cover the subjects of archeology, history, and the natural sciences.

A number of miscellaneous publications, covering scientific and professional subjects, also popular types, including broadside folders and guides, are in process of printing.

Multilithed leaflets, numbering 805,000 and processed in the Department, were issued for many park areas for which no printed literature was available.

RADIO

The major work of the Service in radio during the year was the preparation of a new series of half-hour programs concerned with travel and titled "Two on a Trip." The 13 scripts in the series utilized a new approach and technique, merging narration, documentation, and dramatization; presenting scenic description, history, legend, adventure, and even travel costs for would-be travelers.

Stations requesting permission to broadcast the series included WNYC, the municipal station in New York City which claims 1,000,000 listeners; WILL, University of Illinois; WHA, University of Wisconsin; WGRC, Louisville, Ky; WIBA, Madison, Wis.; WLW, Cincinnati, Ohio; KWLC, Luther College, Decorah, Iowa; KWSC, State College of Washington, Pullman, Wash.; WMBC, Detroit, Mich.; KTSM, El Paso, Tex.; KBPS, Benson Polytechnic School, Portland, Oreg.; and WCOC, Meridian, Miss.

At the end of the fiscal year, WNYC had asked for an extension of the program, and plans were under way to produce at least six additional scripts. Transcriptions of the program are to be entered in the educational transcription contest to be held in Columbus, Ohio, next year. Scripts in this series are available to all independent radio stations throughout the country. A set of illustrated, multilithed travel tips, to be sent to "Two on 'a Trip" listeners, was also prepared.

Requests continue to come in from radio stations and particularly from schools for copies of the earlier 39-script series, "America's Hours of Destiny," for use on the air and in classrooms.

Cooperation was extended the Civilian Conservation Corps in preparing a radio script for use in Civilian Conservation Corps enrollment programs throughout the country.

LECTURES

The series of free midweekly illustrated lectures conducted from October to May in the Departmental Auditorium in Washington, D. C., reached new heights of listener interest. Capacity audiences were the rule, with hundreds of people frequently turned away. A total of 18 lectures was attended by 28,450 persons. Travel subjects and the popular sciences proved equally interesting to the audiences, which have registered an overwhelming request for continuation of the series next fall.

Assistance also was given during the year to placing cooperating lecturers of high standing on various civic and educational programs.

ENCYCLOPEDIAS AND ALMANACS

Each year an increasing number of the outstanding encyclopedias and almanacs request material on the national parks and Park Service activities generally for their annuals, in addition to periodic review of the main body of national park material in the encyclopedia proper.

CORONADO CUARTO CENTENNIAL COOPERATION

In consonance with the extension service plan inaugurated in 1938 with the widely acclaimed "Celebrated Conservationists" series, the National Park Service, in January 1939, inaugurated a program designed to instil interest in the early history of the Southwest and to promote sympathetic understanding between the United States and its Latin American neighbors. Observance of 1940 as the Coronado Cuarto Centennial made such a project timely and insured Nation-wide participation.

Historians and archeologists of the Service generously met the first year's request for the preparation of suitable articles. For the year beginning January 1940 articles were contributed by nationally and internationally known historians, among them Dr. Herbert Eugene Bolton, authority on Spanish-American history. "Our Own Spanish-American Citizens and the Southwest Which They Colonized" was the title given the 1939 series, which was planned to provide the background for the 1940 series, entitled "The Significance of the Coronado Cuarto Centennial." Distribution has been chiefly through educational systems, libraries, and State historical societies; although the press, travel agencies, and radio have utilized the series.

EXPANSION OF THE FEDERAL PARK SYSTEM

Excellent progress was made on the various proposals and projects to round out the Federal park system. Two national parks, three national monuments, and one national historic site were established; one national cemetery was added by Executive Order; one national park and two national monuments were enlarged; and legislation was enacted by the Congress authorizing establishment of one national historical park. The additions, with adjustments in boundaries of existing areas, increased the total acreage of the system from 20,817,228.14 acres as of June 30, 1939, to 21,550,782.55 acres on June 30, 1940.

As the year closed, the Federal park system included a total of 161 areas, as follows: Twenty-six national parks, 82 national monuments, 4 national historical parks, 11 national military parks, 7

national battlefield sites, 5 national historic sites, 1 national recreational area, 9 national memorials, 12 national cemeteries, 3 national parkways, and the National Capital Parks in the District of Columbia. While 2 national parks were added to the 27 in existence at the beginning of this fiscal year, the absorption of General Grant in the new Kings Canyon National Park and the redesignation of the Abraham Lincoln and Fort McHenry as national historical park and national monument and historic shrine, respectively, make their total 26.

National parks established.—Kings Canyon National Park, Calif., 454,600 acres, March 4, 1940 (General Grant National Park was abolished and became the General Grant Grove Section of Kings Canyon National Park); Isle Royale National Park, Mich., 133,405 acres, April 3, 1940.

National monuments established and other areas transferred to Service.—Tuzigoot National Monument, Ariz., 42 acres, July 25, 1939; Whitman National Monument, Wash., 45 acres, January 20, 1940; Appomattox Court House National Historical Monument, Va., 970 acres, April 10, 1940.

On June 3, 1940, the President by Executive Order No. 8428 transferred to this Service the Custer Battlefield (Mont.) National Cemetery of approximately 640 acres. The order became effective on July 1, 1940.

The Mount Rushmore National Memorial, containing 1,465.51 acres, was transferred to the jurisdiction of the National Park Service by the Second Plan of Government Reorganization.

Under authority of the Historic Sites Act the establishment of the Manassas National Battlefield Park, Va., 1,604 acres, May 10, 1940, completes the roster of new areas acquired during the fiscal year.

Changes in existing Federal park areas.—Olympic National Park, Wash., was increased by 187,411 acres, January 2, 1940; Black Canyon of the Gunnison National Monument, Colo., by 2,771 acres, October 28, 1939; Scotts Bluff National Monument, Nebr., by 46.17 acres, March 29, 1940.

Grand Canyon National Monument, Ariz., was reduced from 273,145 to 201,291 acres, on April 6, 1940.

New designations.—To bring their designations into conformity with the actual character of the areas, Abraham Lincoln National Park, Ky., was redesignated Abraham Lincoln National Historical Park; Fort McHenry National Park, Md., became Fort McHenry National Monument and Historic Shrine; and Chalmette Battlefield Site, La., was redesignated Chalmette National Historical Park.

FURTHER ADDITIONS TO EXISTING FEDERAL PARK AREAS

In addition to the new Federal park areas established, and the enlargement of existing areas already noted, the following lands were added during the fiscal year 1940 to the Federal park system through the adjustment of boundaries of established areas and the acquisition of lands for authorized projects:

Acadia National Park, Maine.—Donations of 1,229.55 acres brought the total area of this park to 17,752.042 acres.

Atlanta campaign markers.—Donations of 20.45 acres were accepted for these markers.

Badlands National Monument.—By transfer from the Department of Agriculture 1,289.39 acres were added to the Government-owned land in this monument.

Blue Ridge Parkway.—Donations of 2,023.45 acres increased the lands acquired for the parkway to 24,600.72 acres.

Boulder Dam National Recreational Area.—Donation of 11.32 acres increased the total holdings of Federal lands to 1,439,843.62 acres.

Capitol Reef National Monument.—Donation of 0.96 acres increased the total holdings of Federal lands to 35,180.96 acres.

Chaco Canyon National Monument.—Donation of 0.92 acres increased the total holdings of Federal lands to 17,636.73 acres.

Chalmette National Historical Park.—By act of August 10, 1939, the Chalmette National Cemetery of 13.60 acres was made part of the national historical park.

Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park, Va.—Donations of 168 335 acres resulted in a total area of 2,399.306 acres.

Glacier National Park.—The purchase of 184.53 acres and the elimination of unsurveyed State sections from private holdings resulted in total Federal holding of 968,171.23 acres.

Grand Canyon National Park.—The purchase of 207.70 acres and the elimination of unsurveyed State sections from private holdings resulted in total Federal lands in this park of 644,395.017 acres.

Great Sand Dunes, Colo.—The acquisition of 28.01 acres by donation brought the Federal lands in the monument to 37,139.714 acres.

Great Smoky Mountains National Park.—The purchase of 2,483.31 acres and the elimination of 2,394.80 acres by exchange resulted in a total acreage of 439,365.875 acres in this park.

Guilford Courthouse National Military Park, N. C.—The acquisition of 2.09 acres by donation brought the total area of this military park to 148.864 acres.

Jefferson National Expansion Memorial project.—The acquisition of 2.826 acres by purchase and 0.779 acres by transfer started this project.

Kenesaw Mountain National Battlefield Site.—The purchase of 499.97 acres resulted in a total area of 2,077.90 acres.

Mammoth Cave National Park, Ky.—The acquisition of 2,145.37 acres by donation and purchase brought the total acreage to 42,631.75 acres.

Natchez Trace Parkway.—The acquisition of 5,126.221 acres by donation brought the total lands acquired for the parkway to 9,814.139 acres.

Petersburg National Military Park, Va.—The acquisition of 15.45 acres by donation and purchase resulted in this park having a total area of 2,046.905 acres.

Petrified Forest National Monument, Ariz.—The acquisition of 2,563.38 acres by exchange brought the total Federal lands in the monument to 77,464.73 acres.

Rocky Mountain National Park.—The acquisition of 160 acres by purchase brought the total Federal lands in this park to 252,073.40 acres.

Shenandoah National Park.—The acquisition of 640.10 acres by donation brought the total acreage of this park to 183,311.69 acres.

Vicksburg National Military Park, Miss.—The acquisition of 11.51 acres by donation resulted in a total acreage of 1,337.998 acres.

White Sands National Monument.—The acquisition of 1,793.33 acres by exchange brought the Federal lands in this monument to 133,366.150 acres.

Yellowstone National Park.—The acquisition of 228 acres by purchase brought the Federal lands in this park to 2,213,229.97 acres.

Yosemite National Park.—The completion of the acquisition in the authorized Carl Inn extension added 8,206.78 acres to the park and resulted in a total area of 761,111.10 acres.

PROPOSED EXTENSIONS TO EXISTING FEDERAL PARK AREAS

Rocky Mountain National Park, Colo.—The act approved June 21, 1930, authorized additions to the park, by proclamation, of certain lands in the Estes Park and Grand Lake areas. Two proclamations adding small tracts were issued in 1930 and 1932. There still remains considerable acreage to be added under this authorization, which is now related to S. 2651 and H. R. 6655, providing for lands in addition to the 1930 authorization that are essential for an entrance parkway, and to round out the park.

Kings Mountain National Military Park, S. C.—It is proposed to increase this area to 4,012 acres by means of a departmental order transferring a portion of the lands in the Kings Mountain Recreational Demonstration Project to the existing national military park.

STATUS OF FEDERAL PARK AREAS AUTHORIZED BY CONGRESS

Cumberland Gap National Historical Park project, Tennessee, Kentucky, Virginia.—An act approved June 11, 1940, authorized establishment of this area, when lands determined to be necessary by the Secretary of the Interior, not exceeding 50,000 acres, have been donated to the Federal Government. Cumberland Gap is one of the most famous mountain passes in America. Traveled by Daniel Boone and other pioneers, who knew it as the "Wilderness Road," and before them by the Indians, it became the gateway through which flowed much of the westward travel out into the rapidly developing Nation.

Big Bend National Park project, Texas.—Authorized by act of June 20, 1935, considerable progress has been made with this 788,682-acre project. The State of Texas is now in a position to transfer to

the Federal Government all of its holdings within the proposed boundaries, totalling some 132,107 acres. A campaign to raise funds by public subscription for purchase of additional lands was started 2 years ago.

Everglades National Park project, Florida.—Authorized by act of May 30, 1934, this 1,545,092-acre project has received new impetus through the strong approval of the proposal indicated by Governor-elect Holland, with accompanying support throughout the State. At present the National Park Service, the Biological Survey, the National Association of Audubon Societies, the Coast Guard, and the State are cooperating in protection of the wildlife and other features of the area.

Saratoga National Historical Park project, New York.—Authorized by act of June 1, 1938. The board of land commissioners of New York has approved transfer of State-owned lands in Saratoga Battlefield, aggregating 1,492 acres, to the Federal Government for inclusion in the park. The 1941 Interior Department Appropriation Act made available \$50,000 for the purchase of approximately 950 acres which must be acquired before the park can be established.

Cape Hatteras National Seashore Recreational Area project, North Carolina.—Pursuant to the act of August 17, 1937, authorizing the Cape Hatteras National Seashore Project, a State Cape Hatteras National Seashore Commission was appointed for the purpose of furthering the land acquisition program. An appropriation of \$10,000 per year was made by the State to meet the expenses of the commission during the 1939 and 1940 fiscal years. The act of June 29, 1940 changes the designation of the area to Cape Hatteras National Seashore Recreational Area and permits limited use of the area for hunting consistent with its proper conservation.

Monocacy National Military Park project, Maryland.—Authorized by act of June 21, 1934. During the year studies were made to determine the sites necessary to tell the story of the Battle of Monocacy, and on which suitable markers can be erected describing the action of the Confederate and Union forces here on July 9, 1864.

Richmond National Battlefield Park project, Virginia.—Authorized by act of March 2, 1936. Establishment of this area awaits clearance of titles to the lands acquired by the State of Virginia for donation to the United States.

Andrew Johnson Homestead National Monument project, Tennessee.—Authorized by act of August 29, 1935. Acquisition of President Johnson's home is made possible by an appropriation of \$44,500 in the 1941 Interior Department Appropriation Act.

Patrick Henry National Monument project, Virginia.—Authorized by act of August 25, 1935. The Interior Department Appropriation

Act for 1941 provides \$25,000 towards the purchase of the Red Hill Estate, home of Patrick Henry.

In addition to the above, there are five previously authorized projects: Fort Frederica, Ga., Fort Stanwix, N. Y., Palm Canyon, Calif., Pioneer, Ky., Spanish War Memorial, Fla., in connection with which no important developments occurred.

PROPOSED ADDITIONS TO FEDERAL PARK SYSTEM

Rehoboth-Assateague National Seashore, Delaware, Maryland, Virginia.—H. R. 9718 introduced on May 9, 1940, would authorize establishment of a stretch of the Eastern Shore for national seashore purposes. Study of the merits of the area, in cooperation with interested local people, was carried on during the year.

Studies in connection with a number of other national seashore possibilities were continued. Included in these considerations were the Barnegat Inlet region of New Jersey, Anastasia Island, Fla., and Padre Island, Tex.

Tensas Swamp National Park, La.—Proposed by H. R. 9720 and S. 4047, introduced May 9, 1940. This area in Madison Parish is distinguished by its extensive stand of virgin timber of rare bottomland hardwoods type, none of which is found in any area of the national park system, and its unusual scenic and biological qualities.

Oregon Coast National Park, Oreg.—Proposed by S. 4064, introduced May 29, 1940. The area, in Curry County, embraces one of the most rugged and scenic portions of the Pacific coast, and is a practically unmodified area combining many outstanding geological and biological features.

Coronado International Monument, Ariz.—An act of July 17, 1939, authorized an expenditure of not to exceed \$10,000 for erection of a suitable monument at or near the point on the international boundary between the United States and Mexico where Coronado first entered what is now the United States. S. 4130, introduced on June 12, 1940, authorizes the President to establish by proclamation an area of approximately 2,960 acres as the Coronado International Monument. The Government of Mexico has been invited by the Department of State to participate in the commemoration of Coronado's expedition by establishing a companion park or monument of approximately the same shape and size on its side of the border.

Adirondack National Recreational Area, New York.—Proposed by S. 3840, introduced April 24, 1940. The bill provides that such an area shall be established when title to such lands within the region of the Adirondack Mountains as may be determined by the Secretary of the

Interior as necessary for this purpose shall have been vested in the United States.

Saint John Island National Recreational Area, Virgin Islands.—Proposed by H. R. 9621, introduced May 1, 1940. Saint John Island, one of the small islands terminating the Lesser Antilles, is distinguished by magnificent beaches, richly colorful forests, and luxuriant and diversified flowering forms. Establishment of this area would provide excellent recreational opportunities for the public, and the economic condition of the approximately 800 natives would be benefited by an increase in tourist trade.

Escalante, Southeastern Utah.—The proposal to establish this area as a unit of the national park system was given considerable impetus. It is proposed to handle the recreational resources of the area, together with the water control, grazing, mining, and other industrial interests therein, under one completely integrated program. This 1,280,000-acre area is practically all in Federal ownership.

Ship Island, Miss.—Located in the Gulf of Mexico, near Gulfport and Biloxi. National monument status is fully justified because of the area's historical significance. It was an important point in the first French settlement of Louisiana; was used as headquarters by British General Packingham prior to his descent on New Orleans in 1814-15, and was a Union navy yard for the Gulf blockading squadron during the War Between the States.

Manuelito, N. Mex.—This proposal for a national monument of approximately 30,000 acres would preserve a highly important link in Southwestern archeology. Its scientific importance has long been recognized by the Smithsonian Institution, National Park Service, and other organizations. During the year, New Mexico cooperated generously in the proposal by purchasing a number of private holdings within the area, and expects ultimately to turn them over to the Federal Government for monument purposes.

FOREST PROTECTION AND FIRE PREVENTION

Fire record.—The forest-fire record for the calendar year 1939 suffered in comparison with 1938 because of one bad fire in Yellowstone National Park. The total number of fires affecting the national parks and monuments was 555, of which 193, or 35 percent, were caused by lightning and 362, or 65 percent, by human agency.

The largest fire in 1939, and the largest that has occurred in Yellowstone since 1931, was the Astringent Creek fire which started from lightning on July 15. This fire burned an area of 1,561 acres, which was more than half the total burned area for the entire national park system for the year.

In the face of most unfavorable weather conditions the Service held its total burned area to only 2,920 acres. Intensive training, plus additional fire guards and equipment, were important factors and contributed greatly to this low loss.

Statistics of the 1939 fire record and of the 10-year fire record (1930 to 1939, inclusive) are shown on page 209.

Fire-protection training.—As in previous years, fire-protection training was particularly stressed. Besides training in fundamentals, which is required of all protection personnel within the Service, emphasis during the year was given to more advanced training to acquaint protection personnel with methods of organization for large fires.

Fire equipment.—As additional protection for both forests and buildings, five 1½-ton fire trucks equipped with water tanks, pumpers, and hose were provided as follows: One each to Yosemite and Mammoth Cave National Parks, Vicksburg and Chickamauga-Chattanooga National Military Parks, and Blue Ridge Parkway.

Detection system.—Improvements in the fire-detection systems within national park areas were provided by the installation of additional fire lookout structures at Mount Washburn in Yellowstone, at White Rock in Great Smoky Mountains, and at Park Point in Mesa Verde National Park; and by erection of one lookout tower in each of the following: Isle Royale and Shenandoah National Parks, Shiloh National Military Park, and Chopawamsic and Versailles Recreational Demonstration Areas. Additional fire lookouts are now under construction in Grand Canyon, Great Smoky Mountains, Shenandoah, and Isle Royale National Parks, and in Bandelier and Lava Beds National Monuments.

Protection planning.—The value of the accumulated fire-protection statistical data for the past 10 years is becoming increasingly evident. This information has facilitated revisions of previous reports of forest-protection requirements for personnel, equipment, and physical improvements so as to improve protection in many areas. It is hoped this study of forest protection requirements for all areas may be completed within the coming year.

C. C. C. assistance in forest protection.—As in preceding years since the establishment of the Civilian Conservation Corps, that organization has been the mainstay for fire suppression, insect and tree disease control, and tree preservation work.

Insect control.—In the Eastern States forest insect conditions were largely endemic. Encouraging progress has been made toward controlling the beech scale at Acadia National Park, an insect which threatens to wipe out unprotected beech forests in the East. Parasitic control of the European spruce sawfly at Acadia is being con-

tinued with indications of success. The southern pine beetle, which had given considerable trouble at Great Smoky Mountains National Park, was virtually controlled by the natural agency of extraordinarily low winter temperatures.

In the Rocky Mountain region forest insect conditions are improved over the previous year. Effective control work against the Black Hills beetle was carried on at Rocky Mountain National Park and Jewel Cave National Monument. The mountain pine beetle infestation in Yellowstone and Grand Teton National Parks has not materially spread. In the latter park continued work with penetrating oils has met with success.

In the Southwest, forest insect conditions were largely endemic, with the exception of the oak looper infestation on Gambel's oak at Mesa Verde. This infestation has now spread over the entire northern half of the park. Control of the Black Hills beetle in Bryce Canyon National Park was continued during the past fall and spring.

In the national parks of Pacific Coast States the most serious problem is in Yosemite National Park. In spite of excellent work done by the C. C. C. a considerable area has received no treatment for the control of *Dendroctonus* in pine owing to the nonavailability of camps when needed and inaccessibility for this type of labor.

White pine blister rust.—In the East white pine blister rust control has been continued in Acadia, Shenandoah, and Great Smoky Mountains National Parks, and plans are being made for work along the Blue Ridge Parkway.

In the Rocky Mountain region plans are being formulated for initial work in Yellowstone.

The advance of the white pine blister rust to the sugar pine forests of California has created a formidable problem in control. The program for control activities has been thoroughly worked out, but appropriations in sufficient amounts have not been made available to enable the Service to maintain the original schedule planned by the Bureau of Entomology and Plant Quarantine. With the exception of fire protection, this is the greatest forest protection problem confronting the Service. During the year initial eradication was accomplished on 31,480 acres in the Western States, bringing its total eradication roughly to 15 percent of the area that must be covered in the western national parks.

Campground protection.—The protection of public campgrounds against deterioration is one of the most urgent forest-protection problems. Studies are being continued to determine the present condition of trees and other vegetation in the intensively used campgrounds of the western national parks. Measures have been taken to protect some of the campgrounds and where this has been done some improvement

has been noted. Studies will continue and measures will be taken to protect the vegetation in these campgrounds insofar as practicable.

Type mapping.—No field type mapping was accomplished during the year. An E. R. A. project in Region IV headquarters in San Francisco continued preparation of copies of type maps for park areas in all regions.

Forest nurseries and planting.—Forest nurseries were operated during the year in Sequoia, Shenandoah, Great Smoky Mountains, and Yellowstone National Parks. In the latter two parks the nursery production is being slowed up, as the peak of their needs for forest-seedling stock has passed. Altogether about one and three-quarter million forest seedlings were planted during the year on areas within the national park system, the stock coming either from National Park Service or Soil Conservation Service nurseries.

PLANNING AND CONSTRUCTION

The planning and general development of new areas and the planning and construction of buildings, bridges, and roads in established areas continued during the 1940 fiscal year on a limited basis. Owing to a curtailment of construction funds, few new projects other than buildings were started, and money was allocated to continue construction on only the most urgent road projects.

Under the road and trail appropriation made available through the Interior Department Appropriation Act, the sum of \$3,500,000 provided for continuation of grading already commenced on a few park roads and approach roads, and for surfacing, guard rail, and post construction to other existing roads. The Public Roads Administration, formerly the Bureau of Public Roads, continued to construct major roads for the Service.

The \$2,000,000 P. W. A. physical-improvement program initiated just before the close of the 1938 calendar year now is substantially completed. In this program were included approximately 100 urgent engineering projects for extensions or replacements to existing water supply, sewage and garbage disposal, and electric power and telephone systems. Also completed under this program were the administration buildings at Great Smoky Mountains and Shenandoah National Parks and a number of other buildings.

Outstanding physical-improvement items for which plans were prepared included administration-museum buildings at Kings Mountain National Military Park and Manassas National Battlefield Park, administration and operators' buildings and general development of the Statue of Liberty, and rehabilitation of the Philadelphia Custom House.

Studies for the development of a number of new areas were commenced, including Kings Canyon National Park, the additions to Olympic National Park, the Vanderbilt Mansion National Historic Site, New York, and the Saratoga National Historical Park project.

Approximately 1,000 job plans were reviewed, including work under all programs (regular park appropriations, C. C. C., P. W. A., E. R. A., W. P. A., etc.). This does not include the mass job plans handled by the regional staffs for State-park, recreational-demonstration, and land-development areas.

Road-maintenance problems for all Service areas demanded increasing attention. Detailed road data and equipment records were maintained to assist the Service in formulating a comprehensive road-maintenance program.

Special study was given to water-supply and waste-disposal problems, reinforced concrete construction, and the design and construction of earthworks.

ENGINEERING LABORATORY

The field of usefulness of the engineering laboratory was extended to include road materials and construction, the preservation of archaeological ruins, and even certain phases of forestry and horticulture. A short course in the theory and application of soil mechanics was given to promote greater appreciation of the value and a wider application of this new and important engineering tool.

Cooperative technical assistance was rendered to the Indian Service in connection with the proposed Gila River Dam and with the Truckee River stabilization in Nevada. Laboratory assistance was given the Forest Service in the investigation of soils for a large dam to be constructed in Puerto Rico.

FIELD RADIO SYSTEMS

Park Service research has resulted in the development of a new type of radio antenna for ranger patrol cars which has created Nation-wide interest, especially among Federal and State agencies. Work is now in progress on the development of a compact ultra-high frequency radio field set that bids fair to surpass anything in this line that has heretofore been available.

The use of radio in general was expanded in the national parks and monuments. A complete new system was designed and installed in the Boulder Dam National Recreational Area. A new system for the Blue Ridge Parkway was designed and construction has started thereon.

PARKWAY DEVELOPMENT

The Blue Ridge and Natchez Trace Parkways, pioneers in their respective fields of recreation and historical motor travel, continued under development with regular Federal appropriations totaling \$4,500,000 for the 1940 fiscal year.

The Blue Ridge Parkway now has 149 miles graded and hard-surfaced, an additional 50 miles graded, and 94 miles under grading contracts. A continuous 140-mile paved unit between Adney Gap, Va., and Deep Gap, N. C., was opened to travel this spring. Development of recreational parks adjacent to the parkway road continued with C. C. C. and E. R. A. forces.

On the Natchez Trace Parkway project grading and bituminous surfacing were completed on 3 sections totaling 36 miles in Mississippi. One section of 11 miles has been graded and 29 miles additional are under construction in Mississippi. In Tennessee 9 miles are under construction. Survey and location work was carried on in Mississippi, Alabama, and Tennessee in collaboration with the Public Roads Administration.

The contracting for a tunnel under Williamsburg, Va., marked the start of the continuation of the Colonial Parkway from that city to Jamestown Island.

ACCOMMODATIONS FURNISHED BY PARK OPERATORS

Hotel and lodge accommodations furnished by private capital in the national parks and monuments and rates charged therefor were given especial attention at the National Park Service Conference held in Santa Fe, N. Mex., October 2 to 8, 1939. Four classifications of cabins were recommended, with specified rates for different types of occupancy. Although not making compulsory the furnishing of all such types of service in every national park or prohibiting rates in excess of those recommended, the Service is requiring special justification in all cases not in conformity with the conference recommendation. A further recommendation of the conference that certain minimum rates be established for popular-priced meals is being generally met by the park operators.

Under a newly established policy, park operators are required to include, with plans of public facilities submitted for approval, data as to cost of construction, proposed rates, and estimated revenue, expense, and resulting net profit, to provide reasonable assurance of satisfactory operation of the proposed facilities on a sound economic basis.

Progress has been made in the control of the prices of groceries, food supplies, and other items coming under the general heading of necessities, to the end that the prices be comparable with those in nearby shopping centers deemed to be in competition for the park business.

In the newer eastern park areas, a policy is gradually being formulated whereby only the daytime needs of visitors for gasoline, oil, food, and picnic supplies shall be met by operations within the parks. The Department favors development of overnight accommodations by private enterprise outside park boundaries.

Proposals for the operation of souvenir concessions in new national parks provide that only native handicraft articles made in the vicinity shall be sold.

During the year the Service continued to cooperate with various park operators in connection with applications for loans pending before the Reconstruction Finance Corporation for the purpose of installing new or additional park facilities.

Effective June 15, regulations with regard to minimum wages and maximum hours of employment of employees of park concessioners, as promulgated on June 18, 1940, were superseded by new regulations amended so as to be in conformity with the Motor Carrier Act of 1935 and the Fair Labor Standards Act of 1938.

After most careful consideration and study, extending over a period of years, on June 10 the Department approved the experimental installation of binocular scenic view finders equipped with coin-operating devices. Sixteen binoculars will be operated by the Service in this try-out, and five by concessioners.

Efforts are being made by both the park operator and the Service to have ready for occupancy by the beginning of next season a new hotel to replace Volcano House, the famous old hostelry on the rim of Kilauea Volcano in Hawaii National Park, destroyed by fire last winter.

The development of the Bright Angel Lodge area in Grand Canyon National Park was completed at a cost of approximately \$300,000. The development for the accommodation of Negroes at Lewis Mountain in Shenandoah National Park has just been completed. Considerable improvements have been made in the Old Faithful Lodge area in Yellowstone National Park. In connection with the lessening of the standard tour of Yellowstone National Park from 3½ to 2½ days, the bus transportation rate was reduced from \$25 to \$22.50.

The Lassen National Park Co. is constructing new "hotel bungalows" in the Manzanita Lake Area in Lassen Volcanic National

Park, in anticipation of the development of all-expense trips between the park operator and the Western Pacific and Southern Pacific Railroads. The Glacier Park Hotel Co. started construction on its new lay-out at Rowe's Creek in Glacier National Park.

Bids were solicited the second time for the furnishing of services to the public in the Government-owned building at the Painted Desert in Petrified Forest National Monument. In Muir Woods National Monument space will be provided for the operator in the administration building now under construction.

After careful preliminary study, proposals were solicited for furnishing minimum daytime use facilities for the public along the Blue Ridge Parkway. The parkway has been divided into seven divisions for concession-operating purposes, four in North Carolina and three in Virginia. No bids were received for furnishing these facilities in division III in Virginia and division V in North Carolina.

The Service is still endeavoring to secure a satisfactory operator to furnish boat service at Isle Royale National Park.

In accordance with the opinion of the Solicitor of the Department and past Service policy all concession permits and contracts granted by the Forest Service in the Kings Canyon National Park and the extension to the Olympic National Park while those areas were under the jurisdiction of the Department of Agriculture are being continued in effect until date of termination.

NATIONAL CAPITAL PARKS

At the request of the Secretary of the Interior a study was made of the organization of the National Capital Parks system by H. S. Wagner, secretary of the Board of Park Commissioners of Summit County, Ohio, and Charles G. Sauers, superintendent of the Cook County Forest Preserve, Ill., following the resignation, through ill health, of Supt. C. Marshall Finnan. Their report, recommending certain changes in the organization and policies of the park office, was submitted in November 1939. The Secretary then requested the Civil Service Commission to conduct examinations to fill the position of superintendent of National Capital Parks, which has been vacant since the beginning of the fiscal year. The Commission is now passing upon the qualifications of the applicants.

Development for human use characterized the progress achieved in expansion of facilities in the local park system during the year. Public appreciation was indicated by the approximately 53,000,000 persons enjoying the parks.

Improvement of major recreation centers, the reconstruction of the Chesapeake & Ohio Canal as a recreational waterway, several projects

to facilitate the flow of traffic over major traffic arteries in the park system, and other projects of a purely utilitarian character were the high lights of the year's development program.

Of especial interest was the opening to the public of Kenilworth Aquatic Gardens, formerly the Shaw Lily Gardens. These gardens, purchased from private ownership for \$50,000 in the fall of 1938 by the United States Army Engineers in connection with flood control, later were transferred to the National Park Service and now are administered as a unit of the National Capital Parks system. The gardens contain more than 100,000 aquatic and subaquatic plants, featuring the more colorful and spectacular varieties of water lily and lotus and provide a park facility of unusual beauty and interest.

Appropriations totalling \$1,852,388 were accounted for during the year. In addition to regular appropriations, this total includes funds for the maintenance of the White House, the operation of five C. C. C. camps, P. W. A., and roads and trails projects.

The construction of an additional arch at the southern end of Key Bridge, to permit the westward extension of the George Washington Memorial Parkway, was completed, and the reconstruction of the Rosslyn Plaza reached an advanced stage. Contract was awarded and grading operations started on the construction of a traffic circle on Columbia Island at the intersection of Memorial Avenue and the George Washington Memorial Parkway. A major program for surgical treatment, cabling, bracing, and pruning of trees in the older parks was successfully carried out.

Directly affecting the park system, although undertaken by other official agencies, were the construction of the National Airport, the Thomas Circle underpass, the Rock Creek diversion sewer, the K Street overpass, and the Massachusetts Avenue bridge projects. Each of these necessitated close cooperation between the National Capital Parks and the agency executing the work and involved reconstruction of park roadways, protection and transplanting of landscape materials, etc.

SANITATION AND SAFETY PRECAUTIONS

Safeguarding the public health is one of the most important phases of national park administration. Visitation of park areas by more than 15 million persons in the course of the year, plus the housing of thousands of employees for periods ranging from a few months to the entire year, creates serious problems of sanitation and public health. To insure the most competent handling of these problems, the National Park Service for a number of years has availed itself

of the cooperation of the outstanding technical agency in this field—the Public Health Service of the Federal Security Agency.

Sanitary engineers of that bureau inspected water supplies, sewerage and sewage disposal, garbage disposal, camps and picnic grounds, swimming pools, and food-handling places in approximately 50 Federal park areas. Approximately 250 plans for the installation of sanitation facilities were reviewed and approved by Public Health engineers.

At the Public Health Service Laboratory in San Francisco bacteriological analysis of 571 samples of water were made, and chemical analyses of 18 samples were made at the California State Hygienic Laboratory. The operations of the swimming pools and recreational areas in the National Capital parks were checked by weekly inspections and laboratory examinations of water samples made in Public Health Service Laboratories. Bacteriological examinations of water in other eastern areas of the Federal park system were made by State health department laboratories.

Careful checks were made of activities connected with the operation of the sewage-water reclamation plant at the south rim of the Grand Canyon and the activated sludge plant in Yosemite Valley, Yosemite National Park, since it is of vital importance that these plants produce highly purified and completely disinfected effluents. The results from both plants were highly satisfactory throughout the year.

Precautions also were taken by the Service against accidents to the visiting public and employees, and to property. Surveys were made at major areas for the purpose of organizing the safety work in the field, training employees in the detection and correction of hazards, and for technical studies of fire protection systems and public safety. Safe practice standards were prepared for use in design, construction, and operation. Such standards include one for propane gas, one for motorboats, and one for oxyacetylene flames.

The Service cooperated with organizations outside the Federal Government through representation on technical committees of national scope. Such cooperation affords opportunities to make contributions in the preparation of standards of interest to the Service and to profit from the views of others interested in accident and fire prevention.

The Service's work in safety has been somewhat handicapped by the lack of adequate personnel to accomplish the objectives desired in safety. Notwithstanding such obstacles, substantial savings have been effected in the compensation costs due to personal injuries to employees since this Service established its Safety Division in March 1937. For example, in 1936 the compensation costs for personal injuries were

about \$156,000, while in 1938, with a 6-percent reduction in personnel, they were about \$85,000, or more than 45 percent decrease. The preliminary figures for 1939 show a further substantial decrease. Such savings are in the public interest; and, even more important, accident prevention activities are a contribution to efficiency as enforced absence of personnel from their regular work results in interference with the orderly operation of an organization's functions.

The National Park Service has continued to participate in the leadership of both the Federal Fire Council and the Federal Interdepartmental Safety Council.

CIVILIAN CONSERVATION CORPS COOPERATION IN PARK WORK

The National Park Service quota of 310 continental C. C. C. camps remained unchanged for the 1940 fiscal year. Ninety camps were operated on national parks and monuments, 22 on recreational demonstration areas, and 198 on State, county, and metropolitan parks. Camps were established for the first time in the Badlands and Chaco Canyon National Monuments, Saratoga National Historical Park project, and Kings Canyon National Park.

Notable improvement was made in work accomplishments during the year, due to better advance planning.

C. C. C. activities in the territories of Hawaii and the Virgin Islands were authorized for 675 enrollees on five projects in Hawaii, 225 additional enrollees in Hawaii National Park, and 500 enrollees on three projects in the Virgin Islands. Activities of the C. C. C. in the territories are similar to and work accomplishments comparable with those of the continental camps. Unlike continental camps, they are operated solely under National Park Service jurisdiction, with food, clothing, medical attention, salaries, recreation, enrollee welfare, and related items, as well as supervision of the work programs, provided by the Service.

The broad program of conservation and recreational development was continued. Such recreational facilities as minor roads, dams, cabins, and other simple park structures, water and sanitary systems, picnic grounds and related facilities, for both extended and day use of areas, were provided to meet public needs. Much progress was made in the conservation of natural resources of water, soil, forest, and wildlife by fire hazard reduction, fire prevention, erosion control, tree and cover planting, forest stand improvement, insect and pest control, etc. Preservation of natural features and scenic values and the rehabilitation and preservation of areas of historical, geological, and archeological importance were continued.

A few items of interest, completed or nearly so, are the public campgrounds and related facilities at Smokemont in the Great Smoky Mountains National Park, trailside shelters along the Appalachian Trail, the amphitheater and the telephone system in Mammoth Cave National Park, reconstruction of the historic Chesapeake & Ohio Canal between Washington and Seneca, Md., and the extension of facilities for winter sports in both National and State parks.

RECREATIONAL DEMONSTRATION AREAS

The 46 Recreational Demonstration projects, authorized under the National Industrial Recovery Act of 1933 as part of a comprehensive program of public works, which numbered 43 in 1939, were further reduced in number when the Bull Run project of 1,476 acres, with additional donated land, became the Manassas National Battlefield Park on May 10, 1940.

Development of the remaining 42 projects in 51 areas was continued, though to a lesser degree than in former years, and consisted principally of provision of administration buildings, picnic areas, extension of organized camping facilities, and trailside improvements including construction of shelters and camp sites.

Visitation to these areas for public recreation and organized camping has doubled each year for 3 successive years. Approximately 600 rural and urban organizations from 200 different communities use the group camping facilities which accommodate about 7,500 persons at one time.

No regular appropriation has yet been made to administer and operate these areas.

EMERGENCY RELIEF ACT PROJECTS

The National Park Service received \$5,467,839, plus administrative funds, from the Work Projects Administration for the operation of 83 development and white collar relief projects, employing a monthly average of 6,614 workers during the year. Development projects were prosecuted on 37 recreational demonstration areas, 13 national monuments, 2 sections of a national parkway, 2 national historical areas, 1 national military park, and 1 proposed national seashore. Seventeen white-collar projects were engaged in statistical analyses, travel bureau, guide and contact station work, and important research.

Work on national park and monument areas comprised restoration and preservation of features of natural and historical importance, scientific research connected with naturalist, archeological and geological programs, guide service, construction of simple park facilities,

and conservation of soil, forests, and waters. Areas of historical interest which benefited from restoration and preservation by E. R. A. forces are Fort Marion National Monument, Fla.; Fort Jefferson National Monument on the Dry Tortugas Key off the coast of Florida; Fort Laramie National Monument, Wyo.; Salem Maritime National Historic Site, Mass., and Homestead National Monument of America, near Beatrice, Nebr.

Work on recreational demonstration areas tapered off materially from last year and consisted of constructing additional facilities for organized camping, swimming, boating, picnicking, and operating, administering, and protecting these areas. Although no new camps were started, much was accomplished to meet demonstrated needs of the operating units.

Through the cooperation of the city of Memphis, which furnished salvaged materials, the Shelby Forest Recreational Demonstration Area was able to construct a custodian's residence, dam, lodge, and affiliated recreational facilities.

The record of the past 7 years in national park work reveals that in 1933 the national park system was increased from a total of 63 national parks and monuments with a total area of 14,701,000 acres, to a system of 128 national parks, monuments, military and historical parks, memorials, and allied areas, through President Roosevelt's Executive order consolidating the administration of all Federal park areas and activities under the National Park Service. One of these units was the National Capital Parks system containing nearly 700 areas and involving a multiplicity of new detail. At the close of the 1940 fiscal year, the total number of areas administered by the Service was 161, totaling 21,550,783 acres. These totals do not include the 42 recreational demonstration areas now operated by the Service, which eventually either will be consolidated with existing Federal parks or will be turned over to the respective States to maintain.

These increased responsibilities stress the need for a permanent Civil Service personnel adequate to carry on the growing Service activities. When the many new duties came to the Service in 1933 through consolidation and relief work, 2,027 permanent employees were conducting all Service work. At the peak of Public Works and other emergency activities, the total personnel amounted to 13,900. At the end of June 1939 the total was 13,751. By June 1940, partly through transfer of the Buildings Branch to the Federal Works Agency, this figure had been reduced to 7,341 employees. Of these, 3,956—more than 50 percent of the total personnel—hold appointments under P. W. A., C. C. C., and E. R. A.—rolls which for several years past have been consistently reduced and which undoubtedly will be more

drastically curtailed in the future as defense activities are expanded. In other words, the personnel of the National Park Service is constantly decreasing, despite the definite upward surge of activities. Steps should be taken to secure funds for adequate civil service permanent personnel to conduct the regular Service activities now maintained through emergency personnel. This applies not only to many activities in the Washington office financed through emergency funds, but also to the administration of numerous field units, in particular those historical areas transferred to the Service in the 1933 consolidation with no funds for their administration or maintenance.

New areas were not the only new responsibility placed upon the National Park Service during the summer of 1933. Then also came the necessity of providing public relief projects—a fight of depressed economic conditions in which the Service wholeheartedly joined. In cooperation with the Public Works Administration, the Civilian Conservation Corps, the Civil Works Administration, and other emergency agencies, projects were initiated and put into operation. Because of the nature of the Federal parks, and the duty of the Service to preserve them in their natural or historic condition, meticulous care was necessary in planning for all emergency work, to insure against developments out of keeping with the inherent principles of national park preservation.

Placing all park administration, protection, and maintenance on a permanent civil-service basis, under appropriations made direct to the National Park Service, would be a forward step in park administration and in the long run an economical one, eliminating the constant turnover in personnel inherent in emergency, non-civil-service positions. Elimination of these abnormal turnovers and of the consequent vast amount of paper work entailed and the building up of stabilized permanent personnel would release many employees in the Service, the Office of the Secretary, and the Civil Service Commission for other needed work.

(After 7 years of outstanding service in the administration of the national park system, Mr. Arno B. Cammerer was forced by ill health to submit his resignation as Director of the National Park Service shortly before the close of the fiscal year. Mr. Newton B. Drury, of California, was selected by Secretary of the Interior Harold L. Ickes to be successor to Mr. Cammerer on August 20, 1940.)

TABLE 1.—Holdings acquired for national park and monument purposes

Federal park system	Holdings acquired from July 1, 1939, through June 30, 1940						Total holdings acquired through June 30, 1940, in acres
	Holdings acquired by purchase			Holdings acquired otherwise than by purchase		Total acquired in acres	
	Government funds	Donated funds	Area in acres	How acquired	Area in acres		
Acadia National Park				Donation	1, 229, 550	1, 229, 550	17, 752, 042
Appomattox Court house National Historical Monument	\$8, 000. 00		6, 370	Donation		6, 370	970, 300
Atlanta campaign markers				Donation	20, 450	20, 450	20, 450
Badlands National Monument				Transfer	1, 289, 390	1, 289, 390	51, 328, 250
Blue Ridge Parkway				Donation	2, 023, 450	2, 023, 450	22, 577, 270
Boulder Dam National Monument				do	11, 320	11, 320	24, 600, 720
Capitol Reef National Monument				do	960	960	46, 080
Chaco Canyon National Monument				do	920	920	960
Chalmette National Historical Park				Transfer	13, 600	13, 600	6, 393, 570
Chickamauga and Chattanooga National Military Park				Donation	-91, 230	-91, 230	29, 520
Colonial National Historical Park							8, 541, 732
Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park	17, 578. 00		139, 550	Donation		139, 550	6, 465, 166
Glacier National Park				Donation	168, 335	168, 335	2, 390, 306
Grand Canyon National Monument	14, 055. 36		184, 530	Exchange	1, 280, 000	184, 530	4, 626, 564
Grand Canyon National Park							6, 500, 000
Great Sand Dunes National Monument	28, 950. 00		207, 700	Donation	28, 010	207, 700	75, 609, 030
Guilford Courthouse National Military Park				Donation			28, 010
Isle Royale National Park	121, 282. 07		188, 510	Donation		88, 510	439, 277, 365
Jefferson National Expansion Memorial project	94, 491. 08	\$23, 943. 46	14, 961, 480	Donation	2, 090	2, 090	146, 744
Kennesaw Mountain National Battlefield Park	319, 986. 00	2, 826	2	do	3, 000, 620	18, 022, 100	105, 376, 520
Kings Canyon National Park	20, 446. 10	499, 970		Transfer	. 779	3, 005	3, 665
Mammoth Cave National Park	626, 011. 00		4, 000, 000	Donation	499, 970	499, 970	2, 077, 900
Manassas National Battlefield Park	6, 521. 04	89, 648. 45	1, 623, 530	Donation		4, 000, 000	4, 000, 000
Mount Rushmore Memorial				{do	521, 840	2, 145, 370	42, 631, 750
Natchez Trace Parkway				{Transfer	136, 100	1, 604, 575	1, 604, 575
Olympic National Park				do	1, 468, 475	1, 465, 510	1, 465, 510
Petersburg National Military Park				Donation	5, 126, 221	5, 126, 221	9, 814, 139
Petrified Forest National Monument				do	36, 000	36, 000	36, 000
Rocky Mountain National Monument	600. 00		2, 690	do	12, 760	15, 450	2, 031, 455
Shenandoah National Park				Exchange	2, 563, 380	2, 563, 380	43, 848, 730
Shenandoah National Park	2, 500. 00		160, 000	Donation		640, 100	5, 216, 400
Shenandoah National Park		2, 001. 00	212, 100	do	428, 000	11, 510	182, 671, 590
Shenandoah National Park				do	11, 510	1, 337, 998	183, 311, 690

¹ 2,483.31 acres were purchased and 2,394.80 acres were eliminated by exchange, resulting in a net gain of 88.510 acres.

TABLE 2.—Appropriations for Administration, Protection, and Maintenance, Expenditures Therefrom, and Revenues, Fiscal Year 1940

Name of park	Appropriated	Expenditures and obligations	Revenues received
Acadia.....	\$55,000	\$54,141.74	\$282.20
Bryce Canyon.....	20,980	20,852.40	-----
Carlsbad Caverns.....	102,170	99,735.62	322,018.69
Crater Lake.....	85,000	84,504.57	53,442.16
General Grant ¹	23,345	23,374.73	15,980.80
Glacier.....	221,210	214,499.68	42,781.86
Grand Canyon.....	129,200	126,966.02	125,822.65
Grand Teton.....	28,400	28,877.19	10,231.49
Great Smoky Mountains.....	89,400	88,415.91	2,432.73
Hawaii.....	62,000	61,547.84	1,000.79
Hot Springs.....	81,870	73,164.63	38,845.33
Isle Royale.....	20,000	304.16	204.47
Lassen Volcanic.....	53,225	52,768.32	19,774.55
Mammoth Cave.....	-----	-----	1,089.86
Mesa Verde.....	59,715	53,608.44	11,084.77
Mount McKinley.....	29,970	29,262.85	628.33
Mount Rainier.....	156,275	153,932.66	57,655.55
National Capital Parks:			
United States.....	263,200	259,854.80	73,674.76
District of Columbia.....	947,793	943,714.43	28,580.95
Olympic.....	50,000	48,994.56	-----
Platt.....	20,325	20,138.55	59.85
Rocky Mountain.....	98,485	94,415.31	68,074.83
Sequoia.....	131,735	130,447.54	58,462.16
Shenandoah.....	75,460	74,786.94	67,089.60
Wind Cave.....	20,170	21,557.98	10,235.18
Yellowstone.....	463,520	455,053.96	395,526.15
Yosemite.....	335,000	327,005.05	339,000.25
Zion.....	49,220	48,533.05	41,856.07
National Monuments.....	283,515	284,260.66	36,155.31
National Historical Parks and Monuments.....	159,560	157,284.94	26,173.41
National Military Parks, Battlefields, Monuments, and Cemeteries.....	428,860	370,534.28	36,311.50
Manassas National Battlefield Park.....	56,000	-----	-----
Kennesaw Mountain National Memorial Military Park.....	55,000	52,626.58	-----
Boulder Dam National Recreational Area.....	99,730	98,542.79	718.00
National Park Service.....	259,580	257,957.68	-----
Regional Offices.....	34,000	36,015.07	5,288.21
Public Buildings and Grounds.....	71,402	65,673.05	-----
General Expenses, National Park Service.....	36,500	33,520.68	-----
Emergency Reconstruction and Fighting Forest Fires.....	40,000	62,599.80	-----
Forest Protection and Fire Prevention.....	120,000	118,444.19	-----
Roads and Trails.....	3,500,000	3,733,853.21	-----
Blue Ridge and Natchez Trace Parkways.....	4,500,000	8,038,369.49	2,976.40
Historic Sites and Buildings.....	24,000	22,114.68	-----
Investigation and Purchase of Water Rights.....	42,000	21,204.38	-----
Mount Rushmore National Memorial Commission.....	175,000	149,275.39	-----
Miscellaneous.....	-----	-----	35,554.77
Total.....	13,557,815	17,092,735.80	1,929,013.63

¹ Made a part of Kings Canyon National Park Mar. 4, 1940.² Excludes \$7,879,560 transferred to "Federal Works Agency."³ Available until expended.

TABLE 3.—Summary of Appropriations for the Administration, Protection, and Improvement of Areas Under the Jurisdiction of the National Park Service, Together With the Revenues Received, for the Fiscal Years 1917¹ to 1940, Inclusive

Year	Department	Appropriation		Revenues
1917	Interior Department.....	\$533,466.67		
	War Department.....	247,200.00		
			\$780,666.67	\$180,652.30
1918	Interior Department.....	529,780.00		
	War Department.....	217,500.00		
			747,280.00	² 217,330.55
1919	Interior Department.....	962,205.00		
	War Department.....	50,000.00		
			1,012,205.00	196,678.03
1920			907,070.76	316,877.96
1921			1,058,969.16	396,928.27
1922			1,533,220.00	432,964.89
1923			1,579,520.00	513,706.36
1924			1,759,601.00	663,886.32
1925			3,027,657.00	670,920.98
1926			3,258,409.00	826,454.17
1927			3,933,920.00	703,849.60
1928			4,874,685.00	808,255.81
1929			4,771,515.00	849,272.95
1930			7,890,321.00	1,015,740.56
1931			15,289,435.00	940,364.79
1932			9,595,250.00	820,654.19
1933			10,820,620.00	628,182.06
1933-40			47,513,764.89	
1934			8,957,976.00	731,331.80
1935			12,663,541.38	907,189.96
1936			18,830,280.00	1,136,533.68
1937			17,595,805.00	1,398,691.66
1938			22,590,260.00	1,504,561.84
1939			26,959,977.29	1,567,333.70
1940			13,557,815.00	1,929,013.63

¹ For summary of appropriations and revenues prior to 1917, see 1920 Annual Report, p. 359.² The revenues from the various national parks were expendable during the years 1904 to 1918, inclusive, with the exception of those received from Crater Lake, Mesa Verde, and Rocky Mountain National Parks, the revenues from which were turned into the Treasury to the credit of miscellaneous receipts.

TABLE 4.—Forest-fire statistics, 10-year record, Jan. 1, 1930, to Dec. 31, 1939

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	10-year total	10-year average
Fire occurrence by size:												
Class A fires (¼ acre or less).....	102	193	125	176	205	246	311	228	253	342	2,181	218
Class B fires (between ¼ acre and 10 acres).....	45	63	61	59	108	150	302	114	124	143	1,169	117
Class C fires (over 10 acres).....	13	64	35	42	66	41	120	45	39	70	535	53
Total class A, B, and C fires.....	160	320	221	277	379	437	733	387	416	555	3,885	388
Fire occurrence by causes:												
Campfires.....	25	58	26	28	23	32	26	28	28	22	206	30
Smokers.....	50	85	62	78	115	119	171	121	125	188	1,114	111
Debris burning.....	11	56	27	24	35	43	72	31	37	46	382	38
Incendiary.....	2	45	24	31	51	90	247	53	84	57	674	67
Lumbering.....					2	2	3	1	2	2	13	1
Railroads.....			1	3	1	4	4	2	7	17	39	4
Miscellaneous.....	13	15	16	14	24	30	32	23	20	30	217	22
Total man-caused.....	101	259	156	179	251	320	555	259	303	362	2,745	274
Total lightning.....	59	61	65	98	128	117	178	128	113	193	1,140	114
Grand total.....	160	320	221	277	379	437	733	387	416	555	3,885	388
Total number of park visitors Number of visitors per fire started by campers and smokers.....	3,246,656	3,544,856	3,754,596	3,481,590	6,337,206	7,676,490	9,929,432	11,635,181	113,176,619	15,500,000	78,282,626	7,828,263
Total cost of fire fighting (exclusive of C. C. C.).....	43,288	24,789	42,666	32,845	45,921	50,838	50,403	78,359	86,121	73,809	-----	52,904
C. C. C. man-days contributed.....	\$28,843	\$176,855	\$19,199	\$23,959	\$33,420	\$37,494	\$92,373	\$4,944	\$2,297	\$44,063	\$463,477	\$46,348
					44,339	29,326	30,047	7,417	5,293	22,230	138,652	23,652
Area burned inside parks:												
Forest.....	3,248	23,313	4,181	4,777	4,545	1,861	11,847	688	344	2,009	56,903	5,690
Brush.....	407	2,877	182	219	2,101	498	220	13	9	100	6,635	663
Grass.....	687	1,316	180	116	550	343	3,974	871	926	712	9,705	971
Total.....	4,342	27,536	4,543	5,112	7,196	2,702	16,041	1,572	1,279	2,920	73,243	7,324
Average acreage per fire.....	27	86	20	18	18	6	21	4	3	5	-----	18
Total area needing protection.....	6,241,074	6,407,048	6,502,074	6,902,319	7,451,080	7,451,060	7,648,462	7,858,914	8,212,978	9,100,000	-----	7,377,500
Area burned per million acres pro- tected.....	635	4,297	698	741	966	362	2,097	200	155	321	-----	989

! Exclusive of visitors to miscellaneous memorials and areas with little or no fire hazard.

* 6-year average.

TABLE 5.—Interpretive Contacts Recorded Under the Naturalist Program

	Guided Trips		Lectures		Attended stations		Unattended Stations		Total Con- tacts	Total Visi- tors
	Number	Attend- ance	Number	Attend- ance	Num- ber	Attend- ance	Num- ber	Attend- ance		
NATIONAL PARKS										
Acadia.....	110	3,838	82	12,131	3	42,829	0	0	58,793	-----
Bryce Canyon.....	347	18,116	337	38,159	1	950	1	4,971	62,196	10,795
Carlsbad Caverns.....	551	169,925	90	29,674	2	82,480	0	0	282,079	227,052
Crocker Lake.....	188	3,324	588	30,483	3	97,939	3	1,569	133,315	236,999
General Grant.....	39	1,340	56	13,214	0	0	1	14,449	35,003	127,979
Glacier.....	810	18,190	441	33,414	2	114,497	2	72,675	238,776	159,658
Grand Canyon.....	401	26,997	1,360	145,096	3	182,086	4	6,993	360,172	397,839
Grand Teton.....	125	2,337	98	16,387	1	40,407	1	2,383	61,714	87,387
Great Smoky Mountains.....	205	4,404	47	6,482	1	225	0	0	11,111	814,145
Hawaii.....	315	8,322	267	19,553	1	45,015	5	120,800	193,690	252,031
Hot Springs.....	1	85	15	558	1	24,485	1	1,250	26,378	164,214
Lassen Volcanic.....	175	7,035	267	37,425	2	13,629	1	2,400	60,489	99,733
Mount McKinley.....	35	753	49	1,448	0	65	0	0	2,266	1,679
Mount Rainier.....	572	9,317	427	27,612	4	193,135	4	24,500	254,594	400,727
National Capital.....	126	4,391	43	21,787	0	0	1	4,450	30,628	-----
Rocky Mountain.....	303	9,564	394	48,753	3	95,849	1	6,452	160,618	615,598
Sequoia.....	444	12,375	450	116,021	5	56,118	3	87,495	272,009	273,225
Shenandoah.....	22	423	44	3,186	0	0	0	0	3,609	909,542
Wind Cave.....	10,996	0	0	2,150	1	0	0	0	13,146	18,133
Yellowstone.....	7,149	80,057	1,840	325,554	6	914,418	5	110,800	1,430,829	506,604
Yosemite.....	652	24,503	1,837	426,350	3	280,393	4	52,800	784,016	511,734
Zion.....	208	11,771	576	88,885	1	9,633	0	0	110,289	162,451
OTHER AREAS										
Boulder Dam.....	193	4,159	757	34,147	5	58,157	0	0	96,463	584,921
Mammoth Cave.....	42	54,740	41	1,595	0	0	0	0	56,335	109,391
Total.....	13,013	485,962	10,106	1,484,144	49	2,254,460	37	513,987	1,738,553	6,673,837
NATIONAL MONUMENTS										
Cedar Breaks.....	14	78	120	2,310	1	6,657	0	0	9,045	15,826
Death Valley.....	27	645	276	22,249	5	9,882	1	8,541	41,317	78,507
Dinosaur.....	1,502	10,595	1,534	18,412	0	0	1	2,578	31,585	13,169
Lava Beds.....	2,012	8,147	9	1,701	3	23,326	3	11,652	44,826	35,548
Lehman Caves.....	429	2,782	0	0	1	238	0	0	3,020	3,629
Muir Woods.....	1,593	30,546	0	0	0	0	2	145,676	176,222	163,198
Oregon Caves.....	-----	13,500	666	15,380	0	0	3	1,150	30,030	30,236

Petrified Forest.....	563	12,098	994	25,404	1	111,624	1	41,026	190,152	174,820
Timpanogos Cave.....	1,257	12,370	6	25,226	1	3,529	1	75	16,200	12,182
Total.....	7,397	90,761	3,605	85,682	12	155,256	12	210,698	542,397	527,115
SOUTHWESTERN NATIONAL MONUMENTS										
Archos.....	164	789	1	43	1	25	0	0	857	2,241
Capulin Mountain.....	1	26	1	526	1	1,000	5	548	2,100	29,300
Chiricahua.....	681	3,389	571	2,615	0	0	1	636	6,640	7,817
Natural Bridges.....	147	641	4	32	0	0	0	0	673	677
Organ Pipe Cactus.....	11	48	20	419	2	95	2	34	596	8,910
Saguaro.....	243	808	39	172	1	578	0	0	1,558	15,995
White Sands.....	372	1,834	1,777	10,570	1	7,594	1	589	20,587	37,086
Total.....	1,619	7,535	2,413	14,377	6	9,292	9	1,807	33,011	102,026
Washington and Regional staffs.....	1	54	67	7,464					7,518	
Grand total.....	22,030	584,312	16,191	1,591,667	67	2,419,008	58	726,492	5,321,479	7,302,978

TABLE 6.—Statement Showing Work Accomplished at Civilian Conservation Corps Camps Under the Jurisdiction of the National Park Service July 1, 1939, to June 30, 1940

Item	Unit	Total work accomplished July 1, 1939, to June 30, 1940			
		New construction		Maintenance	
		National parks and monuments	State parks	Combined total national parks and State parks	National parks and monuments
Bridges:					
Foot and horse	Number	3	63	66	14
Vehicle	Number	2	36	38	123
Barns	Number	1	7	8	3
Bathhouses	Number	2	24	26	
Cabins, overnight	Number		213	213	
Combination buildings	Number		40	40	
Dwellings	Number	56	31	87	131
Equipment and supply storage houses	Number	30	21	51	24
Garages	Number	15	28	43	1
Latrines and toilets	Number	83	149	232	55
Lodges and museums	Number	4	18	22	7
Lookout houses	Number	1		1	3
Lookout towers	Number	3	8	11	11
Shelters	Number	24	64	88	
Other buildings	Number	62	105	167	343
Cribbing, including filling	Cubic yards	2, 100	12, 327	14, 427	
Impounding and large diversion dams	Number	2	10	12	1
Fences	Rods	13, 620.3	42, 346.4	55, 966.7	15, 222.3
Guard rails	Rods	1, 418.3	12, 944.7	14, 363	570
Levees, dykes, jetties, and groins	Cubic yards	19, 511	90, 915	110, 426	
Power lines	Miles	28	46.2	74.2	38.3
Incinerators	Number	7	45	52	2
Sewage and waste disposal systems	Number	65	311	376	118
Telephone lines	Miles	177.1	180.2	357.3	1, 023.6
Fountains, drinking	Number	14	182	196	
Pipe or tile lines	Linear feet	221, 354	381, 938	603, 292	32, 646
Storage facilities (omit last 000)	Gallons	566.7	11, 370	11, 936.7	
Wells, including pumps and pump-houses	Number	6	49	55	
Miscellaneous	Number	4	32	36	3
Camp stoves or fireplaces	Number	358	1, 729	2, 087	
Cattle guards	Number	2	16	18	
Corrals	Number		3	3	1
Seats	Number		355	355	
Signs, markers, and monuments	Number	5, 820	5, 507	11, 327	2, 572
Stone walls	Rods	510.5	1, 782.4	2, 292.9	1, 550
Table and bench combination	Number	530	3, 548	4, 078	13
Tool boxes	Number	53	60	113	
Miscellaneous structures	Number	284	6, 164	6, 448	16
Radio stations	Number	5		5	21
Springs	Number	10	7	17	1
Small reservoirs	Number	3	10	13	16
Landing docks and piers	Number	303	20	323	3
Airplane landing fields	Number				1
Truck trails or minor roads	Miles	99.5	296.8	396.3	2, 210.5
Foot trails	Miles	33.5	102.9	136.4	393.8
Horse or stock trails	Miles	74.4	74.9	149.3	2, 085.8
Stream and lake bank protection	Square yards	11, 300	255, 183	266, 483	15
Bank sloping	Square yards	147, 742	254, 824	402, 566	944, 230
Check dams:					
Permanent	Number	127	758	885	
Temporary	Number	3, 747	2, 125	5, 872	
Seeding and sodding	Square yards	33, 754	394, 196	427, 980	283, 109
Tree planting, gully	Square yards	185, 450	218, 240	403, 690	
Ditches, diversion	Linear feet	1, 445	20, 308	21, 753	3, 000
Terracing	Miles	0.6	1	1.6	
Channel construction	Linear feet		80	80	
Wind-erosion area treated	Acres		14	14	
Water spreaders (rock, brush, wire)	Linear feet		5, 606	5, 606	
Channels and levees, clearing and cleaning	Square yards	3, 375	32, 907	36, 282	
Reservoir, pond, and lake sites—clearing	Acres	70	550.2	620.2	
Excavating channel, canals, and ditches:					
Earth	Cubic yards	60, 000	1, 079, 760	1, 139, 760	
Rock	Cubic yards	4, 500	1, 510	6, 010	

TABLE 6.—Statement Showing Work Accomplished at Civilian Conservation Corps Camps Under the Jurisdiction of the National Park Service July 1, 1939, to June 30, 1940—Continued

Item	Unit	Total work accomplished July 1, 1939, to June 30, 1940			
		New construction		Maintenance	
		National parks and monuments	State parks	Combined total national parks and State parks	National parks and monuments
Pipe and tile lines and conduits.....	Linear feet.....	19, 525	48, 476	68, 001	-----
Rock or concrete—riprap.....	Square yards.....	22, 085	42, 191	64, 276	-----
Brush or willows—riprap.....	Square yards.....	11, 088	1, 000	12, 088	-----
Water control structures other than dams.....	Number.....	1, 069	1, 044	2, 113	-----
Field planting or seeding (trees).....	Acres.....	4, 312. 7	1, 957. 5	6, 270. 2	4, 723. 2
Forest stand improvement.....	Acres.....	20	60. 3	80. 3	-----
Nurseries.....	Man-days.....	22, 752	50, 980	73, 732	9, 356
Tree seed collection, conifers (cones).....	Bushel.....	28	2, 288	2, 316	-----
Tree seed collection, hardwoods.....	Pounds.....	43, 165	29, 772	72, 937	-----
Collection of tree seedlings.....	Number.....	-----	93, 991	93, 991	-----
Fighting forest fires.....	Man-days.....	40, 192	38, 097	78, 289	-----
Fire breaks.....	Miles.....	11. 5	62. 2	73. 7	45. 7
Fire hazard reduction:					
Roadside and trailside.....	Miles.....	103. 9	219. 4	323. 3	-----
Other.....	Acres.....	4, 029. 5	22, 957. 4	26, 986. 9	-----
Fire suppression.....	Man-days.....	69, 989	108, 086	178, 075	-----
Fire prevention.....	Man-days.....	511	2, 025	2, 536	-----
Tree and plant disease control.....	Acres.....	18, 670. 3	6, 522	25, 192. 3	237
Tree insect pest control.....	Acres.....	33, 418. 8	69, 488	102, 906. 8	7, 080
Beach improvement.....	Acres.....	51	178	229	53
General clean-up.....	Acres.....	22	-----	22	-----
Landscaping, undifferentiated.....	Acres.....	1, 892. 7	2, 372. 8	4, 265. 5	461. 4
Moving and planting trees and shrubs.....	Number.....	364, 649	1, 410, 692	1, 775, 341	261, 890
Parking areas and parking overlooks.....	Square yards.....	44, 415	699, 963	744, 378	97, 850
Public camp-ground development.....	Acres.....	219. 1	246. 4	465. 5	778. 5
Public picnic-ground development.....	Acres.....	24. 2	528. 4	552. 6	165. 2
Razing undesired structures and obliteration.....	Man-days.....	62, 071	153, 094	215, 165	-----
Seed collection (other than tree).....	Pounds.....	176	1, 039	1, 215	-----
Seeding or sodding.....	Acres.....	607. 8	711. 6	1, 319. 4	2, 984. 2
Soil preparation.....	Acres.....	1, 842. 4	521. 7	2, 364. 1	-----
Vista or other selective cutting for effect.....	Acres.....	540. 7	1, 252. 8	1, 793. 5	-----
Walks: concrete, gravel, cinder.....	Linear feet.....	33, 887	54, 236	88, 123	6, 920
Range revegetation.....	Acres.....	692	-----	692	-----
Fish rearing ponds.....	Number.....	1	13	14	63
Food and cover planting and seeding.....	Acres.....	-----	41	41	-----
Lake and pond development.....	Man-days.....	1, 512	41, 335	42, 847	-----
Stocking fish.....	Number.....	1, 382, 760	30, 000	1, 412, 760	-----
Stream development (wildlife).....	Miles.....	4	2	6	-----
Other wildlife activities.....	Man-days.....	11, 373	13, 046	24, 419	154
Wildlife feeding.....	Man-days.....	24	1, 749	1, 773	-----
Wildlife shelters.....	Number.....	-----	352	352	-----
Education, guide, contact station work.....	Man-days.....	57, 168	23, 473	80, 641	-----
Emergency work.....	Man-days.....	15, 224	49, 497	64, 721	-----
Eradication of poisonous weeds or exotic plants.....	Acres.....	451. 4	1, 913. 5	2, 364. 9	-----
Experimental plots.....	Number.....	31	43	74	26
Insect pest control.....	Acres.....	-----	8, 664	8, 664	-----
Maps and models.....	Man-days.....	3, 535	2, 086	5, 621	-----
Marking boundaries.....	Miles.....	304	190. 6	494. 6	-----
Mosquito control.....	Acres.....	25	195	220	-----
Preparation and transportation of materials.....	Man-days.....	172, 321	369, 099	541, 420	-----
Reconnaissance and investigation:					
Archaeological.....	Man-days.....	9, 564	10, 204	19, 768	-----
Other.....	Man-days.....	4, 703	13, 128	17, 831	-----
Restoration of historic structures.....	Number.....	163	11	174	-----
Surveys.....	Man-days.....	23, 473	66, 568	90, 041	-----
Tree preservation.....	Man-days.....	14, 549	25, 685	40, 234	-----
Equipment, repair, or construction.....	Man-days.....	3, 277	3, 861	7, 138	-----
Hydraulic research.....	Man-days.....	61	2, 841	2, 902	-----
Warehousing.....	Man-days.....	4, 439	8, 518	12, 957	-----
Technical service camp buildings.....	Number.....	31	86	117	4
Central repair shop labor.....	Man-days.....	12, 462	11, 502	23, 964	-----
Unclassifiable.....	Man-days.....	272	260	532	-----

OFFICE OF DIRECTOR OF FORESTS

Lee Muck, Director

THE Department of the Interior, established in 1849, was the first Executive Department of the United States with administrative responsibilities in forestry. Long before the creation of the first National forest reserve in 1891 and the granting of authority to administer the National forest reserves in 1897, different bureaus and offices of the Department put forth special efforts to protect and promote the interests of the Federal Government in the forests of the public domain and on other Federal lands. Ever since 1850, when the first Federal timber agents were appointed, but especially following the reorganization and enlargement of the whole timber-agent system in 1877, forest administration has been one of the principal functions of the Department of the Interior.

The practice of forestry in the Department has progressed through the use of special programs designed for application to such diversified forest conditions as exist on the public domain, the National parks and on Indian lands. Because of the highly diversified conditions which characterize these lands the Department of the Interior carries on a wider range of forestry functions and activities than any other Federal Department; and highly significant also is the fact that under its jurisdiction at the present time is almost two-thirds of the area of all Federal lands in the United States proper, and if Alaska is included, then its jurisdiction extends over almost three-fourths of all Federal lands.

NATIONAL DEFENSE

The forest resources under the jurisdiction of the Department are so strategically situated and so well developed as to make substantial contributions to the National defense. These resources were under development during the World War and contributed in full measure to the prosecution thereof. They are in a position to furnish large volumes of essential forest products during the existing emergency and the administrative units in charge of development are being so organized as to meet any increase in demand which may develop.

CUSTODIAN OF VAST LAND AREAS AND DIVERSE FOREST RESOURCES

The vast land areas under the jurisdiction of the Department of the Interior—approximately 268,000,000 acres in the United States proper—occur in all parts of the country but chiefly in the West. The condition of these lands is far more variable than that of any other Federal lands—ranging all the way from bare desert to primeval forests and from practically worthless waste areas to priceless masterpieces of Nature's best productions. This wide range of conditions has resulted in a correspondingly wide range of aims and purposes in the administration of these resources and requires the application of highly diversified policies and practices.

Most of the forest lands managed by the Department of the Interior were set aside for specific purposes by definite congressional enactments. The objectives set forth in the creating legislation vary from the preservation of the forests in their natural condition, as is the case in National parks, to the commercial handling of forests, including logging, as is the rule on Indian lands and the revested and reconveyed Federal forest lands in western Oregon. The Department thus finds itself the custodian of vast land areas which divide themselves quite naturally and readily into several categories of permitted land use, each category being administered by and under the jurisdiction of a separate office, bureau, service, or administration—all coordinated and directed by a Director of Forests in the Office of the Secretary of the Interior.

REPORT TO THE JOINT CONGRESSIONAL COMMITTEE ON FORESTRY

In a message to the Congress dated March 14, 1938, the President recommended the appointment of a committee to study the forest situation in the United States with a view to providing a basis for the enactment of essential legislation in the field of forest conservation. This message led to the approval by the Congress on June 14, 1938, of Joint Congressional Resolution No. 31 which established a Joint Committee on Forestry. The Committee held public hearings throughout the United States and has assembled an exhaustive record covering the forestry problems of the Nation.

Inasmuch as the Department of the Interior is charged with the care of the forests and forage on approximately 267,000,000 acres of public land in the continental United States, its activities in the field of conservation are of material importance as affecting a balanced timber budget and the concomitant influences of timber and forage growth. Accordingly, with a view to being helpful to the Joint Con-

gressional Committee on Forestry a complete report was compiled by the Department covering its conservation policies, programs, and practices and submitted to the chairman of the committee under date of February 27, 1940. The major recommendations contained in the report were as follows:

1. Enact legislation authorizing the establishment of Indian forest reserves and providing for the administration thereof under principles of cooperative sustained-yield forest management.

2. Enact legislation authorizing the administration of unreserved public domain lands, intermingled with and lying adjacent to the O. & C. lands under principles of cooperative sustained-yield forest management.

3. Enact legislation authorizing the sale of forest products from areas within grazing districts under appropriate rules and regulations.

4. Provide increased funds for the protection of the lands administered by the Department—particularly the O. & C. grant lands, the remaining unreserved lands of the public domain, the National parks, and the forests of the interior of Alaska.

5. Provide funds for listing the scattered unreserved public-domain lands not included in grazing districts and for surveying their resources; preparing a map and formulating a plan for the future disposition, exchange, consolidation, and management of these lands.

6. Provide adequate funds for range studies and surveys, range revegetation, and range improvements covering the public lands incorporated in organized grazing districts.

FORESTRY PROBLEMS HANDLED

In addition to completing the compilation of the Departmental report on forestry for the Joint Congressional Committee during the fiscal year 1940, the office of Director of Forests discharged its regular responsibilities covering the coordination of the activities of the several divisions of the Department which are concerned with forest management. Marked progress was made in perfecting the organization of the O. & C. grant lands; a large volume of Indian forestry business was handled; two important Indian timber damage suits were brought to a successful conclusion; contributions were made to the Forest Industries Conference of which the Director is the chairman; much assistance was rendered to the land committee of the National Resources Planning Board; and advisory services were given on a large number of cases and problems to the various agencies of the Department charged with administrative responsibility in forest conservation.

A review of the constructive results attained during 1940 and a consideration of the advances made by the Department in the field of forest management, provides complete justification for the establishment of the Office of Director of Forests. In no other Federal department is there so great a diversity of forestry work,

ranging all the way from absolute forest preservation in the National parks to intensive timber development operations on Indian lands and the revested and reconveyed Federal lands of western Oregon. However, in spite of this diversity in objectives and activities much has already been accomplished in effecting a close cooperation of all agencies dealing with forestry and in securing a comparatively high level of effective business management.

BUSINESS MANAGEMENT

It is the policy of the Department of the Interior to make the management of its industrial forests models of economy and good business. In fact, the administration of Indian forests and the revested and reconveyed forests of western Oregon has always been conducted well within income.

A consideration of the results of operations on Indian forests for the period 1910 to 1939, inclusive, discloses a gross income of \$46,142,780. The cost of administration and protection during the same period totaled \$7,542,900, thereby reflecting an average ratio of cost to income of approximately 16 percent. The total income from Indian forest and range lands during the fiscal year ended June 30, 1940, was \$2,718,397 and the cost of administration and protection was \$501,500, reflecting an operating coefficient of approximately 18 percent.

The income from the sale of timber on the O. and C. grant lands for the period 1918 to 1939, inclusive, was \$10,250,150 and the cost of administration and protection during this same period averaged less than 3 percent thereof. Subsequent to the enactment of the act of August 28, 1937 (50 Stat. 874) administrative costs have increased materially by reason of the application of a policy of sustained-yield forest management. However, there has been an increase in revenues and costs are constrained by law to 25 percent of the income.

According to the report of the Chief Forester, receipts for the fiscal year ended June 30, 1940, totaled \$852,647 and the cost of administration and protection was \$160,000, thereby reflecting a ratio of cost to income of approximately 18 percent or less than the operating coefficient provided by the 1937 act.

The operating relationships revealed in the foregoing analyses furnish convincing evidence that the industrial forests under the jurisdiction of the Department of the Interior are being managed on a sound business basis. It should be pointed out, however, that the funds being made available for the administration of these substantial revenue producing projects are not sufficient to attain the

high degree of effectiveness which is warranted; that a more intensive management of these forests would be of inestimable value to the Nation and would make possible a substantial increase in the revenues received.

FOREST PROTECTION

The protection organizations of the National Park Service, the Indian Service, and the O. and C. Administration functioned effectively during the fiscal year 1940. Weather conditions were comparatively unfavorable and a large number of fires were suppressed. However, losses were held at a remarkably low level, when consideration is given to the limited funds being made available for the protection of Interior Department forests.

For the first time in the history of the Department funds were provided for the protection of the interior forests of Alaska during 1940. Although the \$37,500 made available was wholly inadequate, an efficient protection unit, supplemented by the C. C. C., was organized and marked progress made in fire prevention and suppression.

The effective protection of the forests of Alaska is a matter of grave concern from the standpoint of National defense and by reason thereof an earnest effort was made to secure a substantial increase in the appropriation for the year 1941. However, the amount authorized for this purpose was reduced to \$27,000 and as a result the organization will be seriously handicapped during the current fiscal year in spite of the increased demand upon its services which have developed with the existing emergency.

PETROLEUM CONSERVATION DIVISION

George W. Holland, *Director*

THE Petroleum Conservation Division was established to assist the Secretary of the Interior in administering the Act of February 22, 1935 (49 Stat. 30), as amended, the so-called Connally law; to cooperate with the Interstate Oil Compact Commission and the oil- and gas-producing States in the prevention of waste in oil and gas production and in the adoption of uniform oil- and gas-conservation laws and regulations; and to keep informed currently as to the movement of petroleum and petroleum products in interstate commerce in order to be in position to report to the President a lack of parity between the supply of and the consumptive demand for petroleum and petroleum products.

The Connally law was to have expired June 30, 1939, but by an act of Congress approved June 29, 1939, it was extended to June 30, 1942. This law regulates interstate and foreign commerce in petroleum and petroleum products by prohibiting shipment in such commerce of petroleum and its products produced in violation of State law. By Executive Order petroleum or petroleum products shipped from Louisiana or Texas ports are required to be reported. Likewise, the discharge of these cargoes in the United States is required to be reported. During the fiscal year, approximately 13,500 shipments were reported to the Division.

OPERATIONS IN THE EAST TEXAS AREA

Federal Tender Board No. 1 operates in a designated area known as the East Texas oil field and is required upon application to issue certificates of clearance, or tenders, permitting the shipment in interstate commerce of petroleum or petroleum products whenever it determines that the petroleum or petroleum products do not constitute contraband oil as defined in the act.

During the fiscal year 4,044 applications for tenders, of which 2,854 were for 185,113,582 barrels of crude oil, 195 for 114,610 barrels of scrubber oil, and 995 for 19,667,112 barrels of products, were received. At the beginning of the period there were pending 12 tenders for crude oil, one for scrubber oil, and one for products. At the end of the period there were pending 7 tenders for crude oil and one for

products; consequently, the Board took action on 4,050 tenders. It did not approve 48 tenders for crude oil amounting to 102,466 barrels and 3 tenders for products amounting to 3,346 barrels and before approval it reduced tenders for crude oil 1,078,828 barrels and for products 21,823 barrels. The aggregate quantity of petroleum approved for shipment in interstate commerce was substantially larger than that actually produced in the East Texas field, owing to the re-tendering monthly of legally produced oil held in storage and oil previously tendered but not shipped, the approval of tenders covering oil produced elsewhere but received in the East Texas area, and the issuance of tenders on oil interchanged between companies operating in the area.

The allowable production for East Texas during the fiscal year was 142,202,501 barrels of which 139,555,087 barrels or more than 98 percent was reported to the Board. During the fiscal year the reported production from leases was 139,267,471 barrels which with changes in stocks and other internal field movements made available 140,339,148 barrels of East Texas crude; of this 135,478,606 barrels, or 96.54 percent, moved directly from the field by pipe lines (135,400,865) and railroads and trucks, and 4,552,120 barrels, or 3.24 percent, moved to refineries located within the field.

There were 25,829 producing oil wells in the East Texas field on June 30, 1940, which was 29 less than the same time last year even though 264 wells were completed during the year. The average density of the field was increased from one well per 5.1 acres on June 30, 1939, to one well per 5.09 acres on June 30, 1940. Fewer wells were drilled in the East Texas field during the year than in any other year of its history and correspondingly the well density was more nearly stationary. The average bottom hole pressure declined from 1,085.08 pounds per square inch in June 1939, to 1,059.61 as of June 1940, a decrease of 25.47 pounds compared with a decline of 35.76 pounds last year. An average of nearly 5,500,000 barrels of crude oil was produced for each pound of decline in reservoir pressure as compared with approximately 4,000,000 barrels for the preceding year.

Fifteen natural gasoline plants, which were connected to an average of 24,296 wells, reported operations to Federal Tender Board No. 1 during the fiscal year. These plants processed 45,538,787,000 cubic feet of lease and still gas and manufactured a total of 7,081,533 barrels of products. This represents an average of 6.53 gallons of natural gasoline, butane and propane, per thousand cubic feet of well gas processed as compared with 6.09 the previous fiscal year. The average monthly production of gas per well was 155.54 thousand

cubic feet and the average gas-oil ratio of the 24,296 wells connected to reporting gasoline plants was 336.40 cubic feet per barrel of oil.

Summary of East Texas Refinery Operation,¹ 1940 Fiscal Year

	Barrels	Percent
East Texas crude to stills.....	4,291,259	99.49
Other Texas crude to stills.....	22,111	.51
Total.....	4,313,370	100.00
Products manufactured:		
Gasoline and naphthas.....	2,648,393	61.19
Kerosene.....	262,054	6.06
Gas oil and distillates.....	99,587	2.30
Fuel oil.....	1,019,236	23.55
Unfinished oils.....	35,059	.81
Losses in refining.....	263,574	6.09
Total.....	4,327,903	100.00

¹ Reporting to Federal Tender Board No. 1.

EXAMINATIONS OUTSIDE THE EAST TEXAS AREA

An office for the investigation of alleged Connally law violations was opened in New Orleans, Louisiana, on July 14, 1939, and a similar office was opened on August 21, 1939, in Lansing, Michigan. The Houston, Texas, office was continued throughout the year. Among the miscellaneous investigations of Federal Tender Board No. 1 authorized by the Secretary of the Interior outside the East Texas area were those of Kansas and Arkansas.

SPECIAL INVESTIGATIONS AND LITIGATION

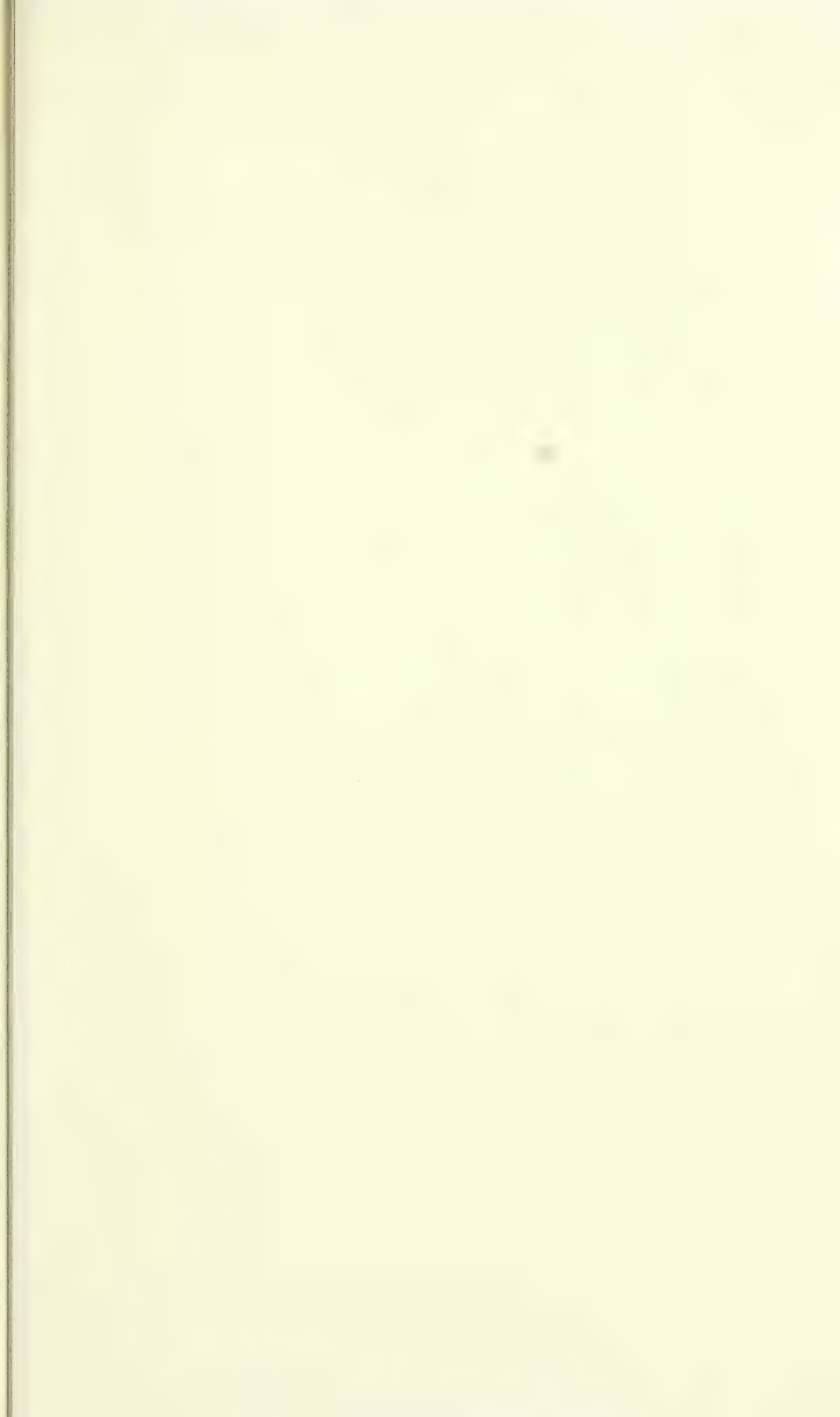
During the period since March 1, 1935, more than 2,000 special investigations have been made of alleged violations of the Connally law, of which about 1,500 did not justify setting up criminal case files. The number of alleged criminal cases investigated and reported was 572, of which 125 have been prosecuted with 121 convictions. Fines assessed and bonds forfeited have totaled \$231,100 of which \$50,000 was assessed during the fiscal year. In addition to fines, 118 defendants have received suspended sentences of from 30 days to 18 months. Action in 424 cases was consolidated with other cases or suspended for lack of adequate evidence. At the close of the fiscal year 12 criminal and civil cases were pending in the courts and 11 cases were under investigation.

COST OF ADMINISTRATION

The administration of the Connally law is essentially a field activity. Of the 74 persons employed at the close of the fiscal year, 60 were in the field and 14 in Washington.

The following table shows the expenditures made of available funds:

Personal Services:		<i>Appropriation</i>
Petroleum Conservation Division	-----	\$41, 261
Federal Tender Board No. 1	-----	180, 037
Total	-----	<u>221, 298</u>
Miscellaneous:		
Materials and supplies	-----	9, 677
Communications	-----	2, 786
Travel	-----	13, 084
Transportation of things	-----	406
Printing and binding	-----	1, 608
Rent of buildings	-----	7, 648
Equipment	-----	2, 327
Total	-----	<u>37, 536</u>
Total obligated	-----	258, 834
Unobligated	-----	1, 166
Total funds available	-----	<u>260, 000</u>





CONSERVATION PROTECTS NATION'S WILDLIFE.

Upper: This mallard is one of more than 3,700,000 North American birds banded since 1920 by Biological Survey officials and cooperators to study migrations and ranges.

Lower: The majestic elk still reigns. Latest estimates compiled by the Biological Survey and its cooperators indicate there are more than 232,000 elk in 24 States.

BUREAU OF BIOLOGICAL SURVEY ¹

Ira N. Gabrielson, *Chief*

INTRODUCTION

WILDLIFE in the United States was in a much better condition with reference to human requirements at the end of the fiscal year 1940 than at the beginning. For a bureau charged with the responsibility of national wildlife administration this satisfactory report would in most years be self-sufficient evidence that the agency was contributing to the national welfare. At a time, however, when nearly all undertakings are being judged in terms of defense against external aggression and internal subversion and when past experience indicates the need for caution against a perversion of patriotic zeal that may even endanger some of the important endowments of what must be defended, a more explicit evaluation of wildlife-restoration progress in terms of social welfare and national solidarity seems essential. In other words, it should be pointed out that the United States is better able to undertake an intensive national-defense program because of the success thus far achieved in restoring and conserving its wildlife and, further, that a continuing wise administration of this natural resource will strengthen a nation's defense against both foreign and domestic dangers.

Conservation—or prudent use—of wildlife is one way of making a country worth living in, a first essential in inspiring zealous defense. An abundant wildlife, in other words, is an added attraction to the outdoors, and outdoor experiences foster the qualities of character that are reflected in the American way of living, a heritage that must be defended. Thus wildlife conservation not only contributes toward defense against subversive tendencies but also develops a national morale that will withstand the stress of any emergency requiring action against forces from without.

Though intangible, this fundamental contribution is continuous and thorough rather than temporary or sporadic. Inconspicuous at any

¹The fifty-fifth annual report of this organization is both its first to the Secretary of the Interior and its last as the Bureau of Biological Survey; in accordance with the President's Reorganization Plan No. II the Survey was transferred from the Department of Agriculture to the Department of the Interior on July 1, 1939; and by Reorganization Plan No. III it was merged with the Bureau of Fisheries on June 30, 1940, to form the Fish and Wildlife Service.

given time and perhaps even overlooked by many during emergencies, the benefits of wildlife conservation are long-time benefits. They will be as important in future requirements for good living and future national emergencies as they are at present. If a high type of conservation is not maintained consistently, the Nation may suffer losses that will be difficult to make up and will impair good living for many years thereafter. Conservation of wildlife in the United States would not in any presently conceivable emergency be consistent with any unusual inroads into the resource, either for meat supplies or for protection against theoretically serious crop losses.

The Biological Survey in administering wildlife has not only encouraged desirable birds and mammals but for many years has also taken the leadership in an intelligent restraint of the numbers of such species as do damage. Carnivorous animals that prey on livestock, rodents that destroy crops or food supplies, carry disease, and by their burrows damage irrigation and other embankments, and birds that prove destructive in orchards and grainfields are being controlled more effectively than ever before as a result of the operations and demonstrations of the Survey. These activities will take on new significance during a national emergency in which food supplies become of critical importance. They can be intensified to any needed degree, yet here too it will be important to exercise due caution, as World War experience indicates that demands for unwise destruction of desirable birds may at such a time be made in the supposed interests of food production. Control activities should never go beyond the demonstrated need.

Personnel and facilities of this agency will be available whenever needed by the Nation for a supreme effort. The field force throughout the country, which is unusually familiar with geographical features, in emergencies could protect areas where damage might impair transportation or weaken defenses. The well-organized and capable body of men engaged in enforcing the Federal laws that protect wildlife could undoubtedly assist in anti-espionage and other under-cover work. Yet it seems important to emphasize that in general the greatest service that this agency can perform during a national emergency is to continue to conserve wildlife as an invaluable natural resource that is at all times essential to the national welfare.

Wildlife conditions in the United States are not yet what they should be everywhere. Those that are favorable are the result of years of planning and carrying out corrective measures that were sorely needed after unwise exploitation. Only in recent years has there been a definite and well-implemented national program to restore and conserve wildlife. In the 55 years since its beginning as a

small unit of three employees concerned with research in economic ornithology, the Biological Survey at the time of its merger with the Bureau of Fisheries at the close of the year had developed into an action as well as a research agency and had become the instrument of a strong national purpose to administer wildlife resources intelligently. The final year of its separate existence was a climax of accomplishment, and its enlarged opportunities as part of the Fish and Wildlife Service are faced with confidence and enthusiasm.

ORGANIZATION CHANGES

The fiscal year 1940 was characterized largely by efforts to improve efficiency by perfecting governmental organization for carrying on conservation activities, the actual work being in the main a continuation of programs already under way looking toward the ultimate objective of sound wildlife restoration. On the first day of the fiscal year the Biological Survey became a part of the Department of the Interior, entering into closer cooperation with other agencies of the Department, including the Bureau of Fisheries, which had simultaneously been transferred to it from the Department of Commerce. A continuance of cooperation with agencies of the Department of Agriculture on matters related to wildlife was agreed to by a formal memorandum.

During the course of the fiscal year the Food Habits research laboratory, after 55 years in Washington, D. C., was transferred to new quarters at the Patuxent Wildlife Research Refuge, Md. Under authority of Reorganization Plan No. II, the Secretary directed the transfer of the Wildlife Division of the National Park Service to the Biological Survey, which became effective on January 1, 1940. Plans also were completed for a reorganization of field work in the United States, the nine regions being rearranged into five. On the last day of the year, in accordance with the President's Reorganization Plan No. III, the consolidation of the Biological Survey and the Bureau of Fisheries to form the Fish and Wildlife Service became effective. Through these changes the Federal Government enters the fiscal year 1941 better organized than ever before to carry on the work of wildlife restoration.

OTHER EVENTS OF THE YEAR

The outstanding events of the year in connection with programs and policies already under way may be summarized as follows:

Research on Game Birds

Canada goose studies.—Investigations of Canada geese and the factors influencing their increase were conducted in Utah, Oregon, and

California, and studies of their feeding habits were made in the Great Basin and in the Northwest.

Experiments in marsh burning.—On the Sabine and Lacassine Refuges, La., experimental burning of marshes indicated that fire is an important tool in management for geese, as an estimated 500,000 geese were attracted to these refuges after the burning.

Industrial operations in wildlife habitat.—Studies were made of wildlife problems on the Santee-Cooper Power and Navigation Project in South Carolina for safeguarding a major winter-concentration area for waterfowl and an ideal river-bottom and forest habitat for one of the purest strains of wild turkey in eastern North America.

Mosquito control and waterfowl habitat.—A detailed experimental project was set up at the Bombay Hook Refuge, Del., and gratifying results were obtained in demonstrating control of salt-marsh mosquitoes with minimum injury to waterfowl habitat.

Quail-nutrition studies.—In investigations on bobwhites, the nutritive value and palatability of several native quail foods were studied and it was developed that common salt is a valuable aid in combating cannibalism among both growing and adult birds.

Fur-Production Investigations

Disposal of Federal furs.—A unified policy was established for handling and disposing of all furs that become the property of the Bureau.

Import quota on foxes.—Largely through cooperation with fur farmers and Federal agencies, an import quota on silver foxes was established, thus preventing the dumping of foreign pelts on the American market and serving to maintain prices paid for silver fox pelts.

Exceptional prices for pelts.—Of unusual interest was the sale of a single Norwegian platinum fox pelt for \$11,000 and an entire lot of 400 platinum skins for more than \$500 each.

Other Wildlife Studies

New laboratories at Research Refuge.—Completion of the C. Hart Merriam Laboratory (named for the first chief of this agency) made available a three-story structure to house the former in-Washington staff of the Food Habits laboratory, and doubling the size of the Henry W. Henshaw Laboratory (named for the second chief) provided needed facilities for wildlife-disease research. These laboratories and a 3,000-acre wood and cultivated tract make extensive research possible on wildlife problems peculiar to the Eastern States.

Completed catalog of type specimens.—A list with data of the 1,323 mammal type specimens in the Biological Survey collection was completed for publication by the United States National Museum.

Research on elk.—A 10-year research on the American elk was completed, and the manuscript reporting it submitted for publication in the North American Fauna series.

Classification of white-tailed deer.—Research in cooperation with the National Museum on the classification and distribution in North and Middle America of the white-tailed deer, the most important American big-game animal, was completed, and 10 new forms were described.

Discovery of vanishing deer.—A herd of between 500 and 1,000 Pacific white-tailed deer, a subspecies previously supposed to be near extirpation, was discovered and studied.

Marsh-ecology research.—Research conducted during the past two years on the ecology of the marshes and swamps of the Gulf region resulted in the preparation of a technical report on alluvial marshes and swamps of Louisiana.

Refuge food and cover studies.—Surveys of wildlife refuges were made to note the relation of native and propagated food and cover plants and animal communities and populations to wildlife welfare and refuge management.

Control methods.—Research developed more effective and selective methods for use in the control of predatory animals and injurious rodents, improved the practices for controlling tree-girdling mice in the Northeastern States, and perfected a method to concentrate the active principle of red squill used in rat control.

Wildlife Restoration

Effectiveness of Federal-aid program.—Experience gained during the first year's Federal aid in wildlife restoration and increased funds enabled the States to undertake wildlife restoration activities more effectively and more extensively, 237 individual projects involving the expenditure of \$2,082,735 having been begun as compared with 58, at a cost of \$343,932, initiated in 1939.

New refuges.—The number of wildlife refuges was increased to 263 and the acreage to 13,635,365; the 3 new refuges were the Susquehanna, Md. (a closed area); the Noxubee, Miss.; and the Bosque del Apache, N. Mex.

Refuges placed under administration.—Eight regular refuges, totaling 1,617,993 acres, were placed under active administration, and 68 easement areas in North Dakota and 4 in Montana were assigned to nearby refuges for administration.

Drainage projects inspected.—Of 202 proposed W. P. A. drainage projects inspected, 150 were approved by the Bureau, 15 disapproved because of adverse effects on wildlife, and 37 approved conditionally.

Refuge revenue.—Income from the sale of surplus big-game animals and other refuge products and for the use of refuge lands totaled \$75,845, of which 25 percent was turned over to the counties in which the refuges are situated and the remainder deposited in the Federal Treasury.

Wildlife increases on refuges.—For the fourth consecutive year, increases were noted all over the country in the wildlife populations using the national wildlife refuges.

Pest Control

Bird damage to crops.—Marked progress was made in determining essential facts regarding damage by certain birds to crops and in working out improved methods and practices for prevention.

Predatory animals.—In safeguarding the Nation's wool and meat supply by protecting livestock, poultry, and game, 116,805 predatory animals were taken in organized control work.

Injurious rodents.—Protection was afforded to agricultural crops, forage and timber resources, soil-conserving structures, and stored food supplies through the treatment under Bureau supervision of 12,174,125 acres infested by injurious rodents and 198,902 premises in rat control.

DISSEMINATION OF WILDLIFE INFORMATION

When transferred from the Department of Agriculture on July 1, 1939, the Bureau ceased to contribute to the various publication series of that Department, other than statistics of hunting stamps and licenses, but continued to disseminate information on wildlife research, conservation, and management in several series of the Department of the Interior, some of them new. Technical reports continue to be issued in the North American Fauna and in a new series of Wildlife Research Bulletins. Popular publications formerly appearing in the Farmers' Bulletin series are now contributed to a new series of Conservation Bulletins of the Department of the Interior and have the same aid of Congressional distribution as was formerly given the Farmers' Bulletins. All other Bureau publications are consolidated in one series of Wildlife Circulars, except posters, annual reports, brief processed Wildlife Leaflets, and the Alaska Game Commission Circulars, which, not being numbered departmental series, remain unchanged.

Continuing other functions of disseminating wildlife information, the Bureau prepared summaries of its findings and announcements of important events for release to the press, and met many demands for special articles in periodicals and for addresses at conventions and meetings. In the radio field it participated in the preparation of national network wildlife programs and assisted in the preparation of a series of 15-minute transcribed radio programs for use by local stations.

To disseminate information through motion pictures it produced three one-reel sound pictures, in both 35-mm. and 16-mm. sizes, on mice in orchards and bears in Alaska; and furnished photographs to writers and publishers for illustrating wildlife-information articles.

The Bureau participated more extensively than previously in the observance of National Wildlife Week, and again took an active part in planning and participating in the North American Wildlife Conference. Members of the technical staff represented the Bureau at other gatherings of scientists and conservationists, and of stockmen, farmers, and others interested in various phases of wildlife research and management, where they had opportunity to present in detail many matters here briefly summarized.

FUNDS AVAILABLE

To finance the work of the Survey for the year a total of \$7,392,524 was available from regular and emergency appropriations. Of this sum, \$3,928,691 was carried in the Agricultural Appropriation Act for regular activities; \$1,111,325 was realized from the sale of Federal migratory-waterfowl hunting stamps; \$820,798 was allocated from the Emergency Relief Appropriation Act of 1939 for water-conservation and wildlife-restoration work, and \$34,216 for related administrative expenses; \$1,293,644 was made available for expenditure in connection with work performed by the C. C. C. on national wildlife refuges; and \$203,850 was allocated by the Public Works Administration for the construction of buildings and other improvements at the Fur Animal Experiment Station, Saratoga Springs, N. Y., and on the Patuxent (Md.) Research Refuge.

RESEARCH ON WILDLIFE STATUS AND MANAGEMENT

THE WATERFOWL SITUATION

Investigations in Canada

Study of the migration of waterfowl in the spring of 1939 substantiated the general accuracy of the preceding January inventory. Nearly 300 carefully picked observers covered the movement and 71

percent noted increased numbers of the birds, compared with the spring flight of 1938. Assured thus of a larger breeding stock, the biologists of the Atlantic, Mississippi, and Central Flyways resumed their investigations on the nesting grounds of Canada, carrying on work in the eastern Maritime Provinces, the eastern Arctic, and the central region, from the international boundary to the Arctic coast. The vast breeding grounds "north of the bush" in central Canada have not been altered by human activity and are found today as satisfactory for nesting waterfowl as when first seen by civilized man. With an adequate stock of birds to populate them fully, they could probably supply, without recruitment from other regions, most of the ducks and geese that at present can be carried through the winter. The evidence demonstrated that the waterfowl population is on an upward trend.

Waterfowl habitats in south-central Canada have been materially improved by the development of small water areas under a program sponsored by the Dominion Government by the passage in 1935 of the Prairie Farms Rehabilitation Act. Appropriations for this purpose totaled \$1,250,000 in 1935, \$1,184,420 in 1936, and \$2,000,000 in 1937, the last year for which figures are available. By July 1939 the Dominion had completed 5,538 "dugouts," 2,388 stock-watering dams, and 568 irrigation projects, a total of 8,494, in addition to more than 200 larger, municipal-community projects. Although only a few of these areas are yet suited to the needs of nesting waterfowl, some were immediately adopted by the birds.

Investigations in Alaska

Indications are that the waterfowl breeding grounds of Alaska are the source of most of the ducks and geese seen in California and other Pacific coast sections, but their great importance has not been fully recognized. The Pacific Flyway biologist made studies of Alaska waterfowl populations and habitats in the valleys of the Yukon, Kuskokwim, Tanana, Innoko, and Iditarod, as well as in those of other rivers of lesser importance, and at the conclusion of work in the twin Yukon and Kuskokwim Deltas, made a reconnaissance north to the delta of the Noatak River, tributary to Kotzebue Sound. The summary of his own observations and of reports of the agents of the Alaska Game Commission and others pointed to a distinct numerical improvement in the geese, swans, and cranes, and indicated that, while the duck population was satisfactory, there were no conspicuous gains over 1938.

Investigations in Mexico

The Central Flyway biologist resumed his winter investigation on the east coast of Mexico south to the head of the Tamiahua Lagoon, while the biologist of the Pacific Flyway was working in the western part of that country from Chihuahua and Coahuila south to Morelos and Guerrero. Although serious drought in eastern Mexico had lowered the levels of coastal lagoons, leaving scores of square miles of mud flats covered with dried aquatic vegetation, the ducks appeared to have no difficulty in finding suitable quarters. The total number wintering in eastern Mexico showed a slight increase over 1938-39, despite varying decreases in the gadwall and the baldpate. Geese in general were present in smaller numbers, but probably at least 5,000,000 waterfowl of all kinds wintered in eastern Mexico. The duck population of the tableland and coastal areas of western Mexico, however, was materially lower than in 1938-39. The season was abnormal, investigations in California, made both before and after the Mexican operations, indicating that large groups of the Pacific Flyway waterfowl had wintered north of the international border.

Investigations in the United States

A greater spring run-off improved nesting conditions on the Federal refuges in the northern plains and increased their production of waterfowl. The extent of the increase is indicated by an estimate of 250,000 ducklings on the Lower Souris Refuge, N. Dak., compared with 40,000 for 1938, and of similar gains on other refuges. It was noteworthy that in several cases the species affected were among those that only a few years ago were considered to be in a precarious condition, among them the redhead, canvasback, and ruddy duck. The Canada goose also made important local gains.

The fall migration was characterized by a delayed movement of the birds. Storms and freezing temperatures came much later than usual, and when winter closed in quickly the waterfowl passed so rapidly through some sections that they were all but unobserved, particularly where there was a shortage of water. The Bureau's volunteer observers, however, submitted more than 500 reports, and considering the abnormal weather, which unquestionably affected the observations, these showed a satisfactory condition of the birds.

The biologists of the Mississippi and Atlantic Flyways devoted the winter to studies of the usual concentrations of ducks and geese in the lower Mississippi Valley and on the south Atlantic coast, the chief wintering grounds for these two flyways, and noted a gratifying increase in both ducks and geese. Supplementing the results

were weekly or monthly reports from refuge managers, game-management agents, and other field officers, the regularity of which kept information current on the movements of the birds and of the conditions affecting them.

Large flocks of ducks from the Atlantic Flyway may cross the Straits of Florida to winter in extensive swamps and at the heads of bays in Cuba, and it is known that some continue eastward to wintering grounds on the island of Hispaniola. This flight is the least known of any included in the flyway system and points to the need of winter investigations in the Greater Antilles. There is no known or suspected important wintering ground of the Mississippi Flyway south of the United States.

The sixth consecutive January inventory was conducted by between 2,000 and 3,000 persons under exceptionally trying conditions, but the results completely vindicated the methods employed. Despite freezing weather extending to the Gulf coast, and prevalent deep snows, the operation was carried out on schedule. Practically the entire field force of the Bureau was utilized, together with personnel of other Federal and State agencies, and aircraft of the Army, Navy, and Coast Guard and of a commercial tire and rubber company. The results indicated that there were about 65,000,000 ducks and geese on the North American Continent at that time in contrast to the low of 27,000,000 estimated for January 1935.

OTHER MIGRATORY GAME BIRDS

In the winter, most of the woodcocks of the continent gather in Louisiana and western Mississippi and the mourning doves of eastern North America concentrate heavily in the Southeastern States. Investigations in January showed that both species suffered serious losses because of abnormally cold weather. A later Nation-wide study showed that both species had been reduced materially in numbers, the woodcock as much as 40 percent in some areas. Appropriate safeguarding action was accordingly taken. A study of the Wilson's snipe showed that it too was affected, but its wider range made the results less menacing.

Studies of the western white-winged dove have been made in Arizona for 3 years, and this year the investigation was extended to include the eastern form in the Rio Grande Valley in Texas. Although the latter study is too new to serve as a basis for administrative action, the indications are that these doves are being heavily overshot in both regions. Regulatory action has been taken to reduce the kill in Arizona and probably must also be done in Texas. It

seems questionable whether this bird can continue to be used as a game species unless the conditions affecting its welfare can be improved.

A detailed report on the status of all migratory game birds, as revealed by the year's investigations, was issued in June as Wildlife Leaflet 165 (processed).

BANDING GAME AND OTHER BIRDS

Work on Federal Refuges

The refuge and other Bureau personnel are now so favorably located that they will be able to band most of the ducks and geese necessary for the continuation of these studies, though a few stations operated by volunteer cooperators are still of primary importance because of the volume of work done. The birds banded on Federal refuges totaled 58,852, an increase of more than 22,000 over 1939. Reports on refuges banding more than 1,000 each are as follows:

Refuge:	Number	Refuge:	Number
Sand Lake, S. Dak-----	17,339	Klamath Lake, Oreg., and Clear Lake and Tule Lake, Calif-----	2,305
Des Lacs, N. Dak-----	8,481	Lower Souris, N. Dak-----	2,298
Bear River, Utah-----	5,534	Sacramento, Calif-----	2,072
Malheur, Oreg-----	5,502	Medicine Lake, Mont-----	1,711
Chautauqua, Ill-----	4,089	Waubay, S. Dak-----	1,288
Piedmont, Ga-----	3,212	Cape Romain, S. C-----	1,012

As opportunities offered, game-management agents, field biologists, and other Bureau employees banded an additional 6,575 birds, bringing the grand total banded by them to 65,427.

Bird-banding Cooperators

To weed out cooperators who had become inactive or had never participated actively in bird-banding work, and to permit the addition of promising new station operators, a drastic revision of the list was in progress at the close of the year. Seven cooperative stations each reported the banding of more than 5,000 birds, as follows: E. A. McIlhenny, Avery Island, La., 28,909; O. L. Austin, North Eastham, Mass., 22,426; C. M. Owens, Monticello, Ark., 12,737; C. C. and F. E. Ludwig, Lansing, Mich., 8,377; G. C. Munro, Honolulu, Hawaii, 7,321; Hugh S. Davis, Tulsa, Okla., 5,670; and Geo. H. Lowery, University, La., 5,420. The work at Avery Island was particularly remarkable, as it included thousands of waterfowl of several species, hundreds of vultures and herons, and a large variety of small nongame birds.

Additional Birds Banded

Birds to the number of 428,185 were reported banded, bringing the total since 1920 to 3,712,327. Species banded in excess of 10,000 were the mallard, 40,046; chimney swift, 38,821; common tern, 24,318; pintail, 21,506; junco, 21,399; white-throated sparrow, 21,147; herring gull, 15,911; grackle, 11,844; and starling, 10,324. For the first time a species of waterfowl headed the list. Additional species of waterfowl banded in excess of 1,000 were the ring-necked duck, 4,560; green-winged teal, 4,524; blue-winged teal, 3,553; baldpate, 2,328; and Canada goose, 1,931. In all, 478 species of birds were banded, the following 9 for the first time: Rhinoceros auklet, Audubon's shearwater, black oystercatcher, sage hen, Mississippi kite, spotted owl, and rufous-crowned sparrow, and in Hawaii the small gray tern and the Phoenix Island shearwater. Records of waterfowl banded in 1939 and 1940 are shown in table 1.

TABLE 1.—Waterfowl Banded During the Fiscal Years 1939 and 1940

Species	1939	1940	Species	1939	1940
	<i>Number</i>	<i>Number</i>		<i>Number</i>	<i>Number</i>
American merganser.....	32	12	Greater scaup.....	914	27
Red-breasted merganser.....	1	4	Lesser scaup.....	5,290	1,958
Hooded merganser.....	14	12	Ring-necked duck.....	1,953	4,560
Mallard:			American goldeneye.....	10	8
Wild.....	15,751	37,969	Barrow's goldeneye.....	1	
Hand-reared.....	981	2,077	Bufflehead.....	18	6
Black, cross.....	20	19	Old squaw.....		4
Black duck:			Harlequin duck.....		3
Wild.....	8,653	9,889	American eider.....	4	1
Hand-reared.....	1,554	98	White-winged scoter.....	23	1
Florida duck.....	86	27	Ruddy duck.....	41	69
Gadwall.....	781	505	Snow goose.....	4	12
Baldpate.....	1,449	2,328	Blue goose.....	16	92
Green-winged teal.....	1,721	4,524	White-fronted goose.....	8	52
Blue-winged teal.....	4,118	3,553	Canada goose:		
Cinnamon teal.....	379	188	Wild.....	1,163	1,815
Shoveler.....	582	714	Hand-reared.....	24	116
Pintail:			Emperor goose.....	1	
Wild.....	18,861	21,419	Fulvous tree duck.....	1	1
Hand-reared.....	299	87	Whistling swan.....	7	1
Wood duck.....	414	686			
Redhead.....	629	557			
Canvasback.....	487	707	Total.....	66,290	94,101

Return and Recovery Records

The total number of new bandings shows a slight decrease from 1939, and the number of banded birds recaptured and reported increased by 5,018 (from 26,998 to 32,016). This is due largely to the greater number of banded ducks and geese at large, so many returns of which result from the hunting kill. Among the returns were records that not only extend the known ranges of the species but also contribute to the knowledge of the flyways and individual migration routes, migration speed, longevity, and other life history details. Reports on outstanding recovery records have been pub-

lished in the quarterly journal *Bird-Banding*, and an article on the winter range of the herring gull, based chiefly on banding data, has been prepared for publication in *The Auk*. *Bird Banding Notes* (vol. 3, no. 1, processed), containing details of the work during the year, was issued in October.

Distribution and Migration Records

Additions to the files on the distribution and migration of North American birds included 19,000 individual observations, together with 1,080 bibliographic cards and 860 locality references. Seasonal migration reports were received from 235 of the 342 observers now listed. *Bird Migration Memorandum No. 5* (63 pp., processed) was issued in November, presenting by flyways a comparative analysis of the fall migrations of 1937 and 1938. Work has been completed on tables analyzing spring migration data from five stations in Florida, North Carolina, Pennsylvania, New York, and New Brunswick, three of which have made reports, almost without a break, since 1886. Distribution maps have been prepared for 26 species of sparrows, and available data have been analyzed for 6 others. Two wildlife leaflets, *Birdbanding* (No. 145) and *Suggestions for Bird Field Study* (No. 150), were revised and a new one, *Original and Present Breeding Ranges of Certain Game Birds* (No. 158) was issued. Distribution and migration sections covering the flycatchers and swallows, to be used in National Museum bulletins on the life history of North American birds, also have been prepared. Corresponding data were included in the volume issued toward the end of the year on the parrots, cuckoos, goatsuckers, hummingbirds, trogons, and related species.

WILDLIFE RELATIONSHIPS TO FOREST AND RANGE

Studies on the San Joaquin Range Experimental Station, Calif., indicate that pocket gopher burrowing actually increased the growth of forage but that the quantity of forage destroyed by these animals exceeded this increase. Methods have been developed to make accurate censuses of ground squirrels, the numbers of which seem to be kept down by intensive grazing though not affected by light to close grazing. Experiments are under way to determine the effects of rodents on soil erosion, porosity, and water percolations. The coyote-deer relationship study on the Los Padres National Forest was completed.

Investigations in New England on improving wildlife foods by planting trees and shrubs show that thrifty 2-year-old plants, top-pruned and properly spaced, were economical in establishing cover

islands and fringes adjacent to forest areas. Annual food patches are not needed in typical New England forests, and special plantings over large areas of food trees for wildlife alone are not justified. The shaping, pruning, and encouraging of the 10 common kinds of food trees and shrubs coming into natural stands seems to be the best means of managing these forests for wildlife.

A report on wild-animal damage to seed and seedlings on cut-over Douglas fir lands of Oregon and Washington is in press, and papers on the relationship of pocket gophers to mountain meadow ranges and the role of rabbits and mountain beavers in Douglas fir plantations have been completed.

Suggestions were made for managing white cedar yards for deer in the Lake States region. As a 12-inch cedar produces 74 pounds of browse and when felled is capable of feeding one deer in winter for about 16 days, it was recommended that cedar be logged late in winter—a critical time for deer.

Studies showed that the European starling (*Sturnus vulgaris*) is becoming a factor in longleaf pine reproduction in Mississippi. Examination of starling stomachs taken in areas where the seed was available disclosed them filled chiefly with pine seed.

BIOLOGICAL INVESTIGATIONS ON WILDLIFE REFUGES

A survey of forage conditions was continued on the Wichita Mountains Wildlife Refuge, Okla., to determine changes during the second year of freedom from livestock. Three-awn grasses, of little forage value and often injurious to grazing animals, grow abundantly over the refuge, most commonly where there has been overgrazing. A browse study plot was established in an area containing growths of sumac, to determine the effect of herbaceous ground cover on the growth and spread of this shrub, as it appears that sumac may be an indicator of overgrazing on some soil types, coming in after the herbaceous cover has been depleted. Mimeographed lists of the mammals, birds, reptiles, and amphibians of the refuge were compiled for distribution.

Studies were begun on the range requirements of antelopes on the Charles Sheldon Antelope Refuge and Range, Nev., and on the Hart Mountain Antelope Refuge, Oreg., with a view to determining the carrying capacity of these areas for antelopes and mule deer and the grazing by domestic stock that can be permitted on the Charles Sheldon tracts. Good progress has been made in this work, which will be extended to include a complete cover-type survey and range map of the areas.

Progressive experiments and observations have been made on the Cape Romain Refuge, S. C., toward the development of Bull Island for wild turkeys. This work, carried on for 2 years, has now been completed as a special project, though work will be continued in a limited way as a study for improving food and cover relationships and for establishing breeding stock of native wild turkeys of pure strain.

WILDLIFE MANAGEMENT RESEARCH

Cooperative Research Units

A 5-year program of basic research on wildlife management problems, carried on at 10 land-grant colleges, has been completed and a second 5-year plan drawn up to obtain information on the best methods to be used in wildlife restoration and management, to demonstrate management practices on large areas, and to provide special training in wildlife work for advanced students. The 10 units were cooperatively financed by the State game and conservation commissions, land-grant colleges, the American Wildlife Institute, and the Bureau of Biological Survey. Advanced degrees were received by 27 students, who completed research on assigned problems. Following were the principal activities of the units:

Maine.—Techniques have been developed for censusing woodcock through counting occupied singing grounds and nests and counting the broods with the aid of dogs trained to locate the birds. Through pen studies snowshoe hares were found to breed the same day young are dropped, the gestation period averaging 36 to 37 days. Factors in the mortality of young rabbits included destruction by the mother, cannibalism, predators, and wandering away. Other work included aquatic plantings in many lakes and studies of deer and moose and of silvicultural methods in relation to wildlife.

Pennsylvania.—The comparative attractiveness to wildlife of two forest areas of different types in Centre County, one of 7,000 and the other of 9,000 acres, was studied. In the barrens, where there was an abundance of browse and mast, ruffed grouse and turkeys were plentiful, and there was one deer to 18 acres. In the Seven Mountains region, where the forest is composed of aged hardwoods with little understory, the grouse were scarce, turkeys plentiful, and there was one deer to 116 acres. Studies were made also of pheasants, ruffed grouse, woodcocks, black bears, and cottontails.

Ohio.—Management practices for fox squirrels were determined and tested in farm wood lots. Land-use factors affecting pheasant production and the value of a refuge system were worked out. Conclusions from red-fox studies indicated that year-round hunting is removing the annual surplus, that the present abundance does not call for control measures, that where poultry is kept from wooded areas in spring, no losses have resulted, and that the average population of foxes is 1.5 per square mile. Studies on raccoons showed a population of 1.12 for each mile of permanent stream or 2.58 per square mile.

Virginia.—Using mass-production methods, 900 wild turkey poults were raised. In one release of 34 birds, 23 survived the first year. Studies showed that the

situation of gobbling areas may influence the utilization of nesting sites in natural range. More than 470 turkey crops, representing all months, were examined. Quails, ruffed grouse, deer, and elk were also featured in the research program.

Alabama.—A 16-mm. color film, Nesting Cycle of the Mourning Dove, was prepared and shown to audiences in several States. Information on management practices was obtained from 450 quail-food plots, as to growth, yield, availability, planting seasons, propagation methods, pests, and diseases. Data from 359 fox stomachs and 32 dens indicated that the major food items of these animals are rabbits and insects, there being little evidence of quail destruction.

Missouri.—Studies of cottontail rabbits revealed an annual average of 3.8 litters per female, of 4.4 young per litter, and of 16.7 young per female. Research into the management of field borders in relation to agriculture and wildlife revealed that (1) bird populations varied in proportion to the density of edge growth; (2) birds were a factor in limiting insect populations; (3) birds seemed to take more harmful than beneficial insects; and (4) field edge growth was of value in protecting crops from destructive insects. Observations on deer showed that 60 species of plants were utilized as food late in summer and in fall and 70 species of woody vegetation in winter. Yields of these foods in post oak forests were 84 pounds per acre in sapling stands, 147 pounds in pole stands, and 128 pounds in merchantable stands. Management practices for quail included restriction of the kill, planting of food patches, and reduction in burning, grazing, and clean-up activities, resulting in an increase in quail on a 5,000-acre area from 996 in 1937 to 2,778 in 1939. Studies were made also of chukar partridges and prairie chickens. Although 165,000 live rabbits were shipped to 20 States during the year, a winter census revealed no depletion in the local rabbit population.

Iowa.—A 5-year study in quail management on two agricultural areas showed that three severe winters accounted for 87, 74, and 55 percent losses, with midwinter starvation, clean-harvested cornfields, and a high rate of predation as important factors. For nesting, redhead ducks were found to require small pot holes of 5 to 20 acres and open water within 150 feet of the nest. Studies yielded valuable information also on ring-necked pheasants, mourning doves, raccoons, cottontails, foxes, skunks, and fox squirrels.

Texas.—In central Texas, observations on quail headquarter areas, having brush-and-pole shelters and food patches, showed 75 percent occupied and in the coastal prairie region 63 percent. Studies on prairie chickens showed that the limiting factors were land cultivation, pasture burning, May rains, over-shooting, heavy grazing, and development of oil fields, drainage canals, and roads. Three county wildlife surveys and a study of relation of land-use practices to wildlife in eastern Texas were completed. Reports for the agricultural-extension program showed that 25,000 farm people in 207 counties cooperated in aiding wildlife on 27,000,000 acres.

Utah.—Observations on sharp-tailed grouse in 16 areas having a population of 1,000 birds showed that of 106 nests, 40 hatched, and 66 were destroyed by farming, and that 83 percent in native-grass vegetation were successful, and in cultivated fields 27 percent. In 1940, 47 broods averaged 10 birds each. Sage grouse studies at the DuBois Sheep Experiment Station (Idaho) revealed that of 132 nests, 51.5 percent were successful, and that of the nests lost, 38.8 percent were destroyed by livestock, 22.2 by crows, 22.2 by coyotes, 5.5 by weasels, and 11.3 percent by unknown agents. Other studies involved deer, elk, and beavers.

Oregon.—Studies on ring-necked pheasants on Protection Island (Washington) indicated that where 10 cocks and 6 hens had been released in 1937 under

natural conditions, there were, in 1940, 185 cocks and 97 hens. Records for the Willamette Valley in 1936 showed 1 game bird to 77 acres, and in 1940, 1 bird to 10 acres. One demonstration management area, without restocking, beginning with 1 bird per 100 acres in 1936, harbored a population in 1940 of 16 birds per 100 acres. Studies were completed on the antelope and sage grouse and on mule deer problem areas.

STATE BIOLOGICAL SURVEYS AND FAUNAL STUDIES

Preparation of the report on the mammals of Arizona was resumed near the close of the year. Work was continued on the mammals of Florida, and the report almost finished. A revision of the raccoons was brought nearly to completion. Research on the life history, economic status, classification, and distribution of the wolves of North America advanced, and the results are now being arranged for publication. A manuscript on the American elk was completed.

Investigations on the life zones and mammals of Washington, begun several years ago, continued with progress. A comprehensive work entitled "Birds of Oregon" (650 pp., illus.), under the authorship of the Chief of the Biological Survey and Stanley G. Jewett, regional biologist, was published in April by the Oregon State College, thus making available to the public the results of information on the bird life of the State. A manuscript on the extensive study of the birds of Texas should be ready for printing by the end of the calendar year. In an intensive study of the marten in Idaho particular emphasis was placed on its relation to other animals and on trapping. This animal is generally considered a vanishing species, and the study indicates that the chief cause of its scarcity is overtrapping.

Research on the wild turkey has shown that the effects of civilization are to extirpate the species where suitable management is not applied. At no place is the bird increasing in numbers or even holding its own in the absence of such objective management. The principal factor in its decrease is a hunting take, both legal and illegal, in excess of the annual increment above breeding populations. Other factors are natural enemies, unfavorable changes in range ecology, disease, deforestation, industrialism, and human influences in the vicinity of its range, drainage, fire, overgrazing by domestic stock, and interbreeding with domestic varieties.

The study collections of mammals, birds, and other vertebrates continue to be essential both for the Bureau's research work and as a basis for administrative operations. Continued progress has been made in recording information based on collections, reports, and publications and in preparing reports on relationships, distribution, and habits of species. During the year 624 mammal specimens were

added to the collection, 1,191 were identified for 30 institutions and individuals in 27 States and 1 foreign country, 92 were borrowed for study from 3 institutions in 3 States, and 591 were loaned to 13 institutions and individuals in 11 States. Bird specimens to the number of 1,536 were added to the collection, 859 were identified for 35 institutions and individuals in 20 States and 1 foreign country, and 358 were loaned to 19 institutions and individuals in 11 States and 1 foreign country.

Bureau biologists described 27 new mammals belonging to the genera *Dipodomys*, *Odocoileus*, *Onychomys*, *Neotoma*, *Perognathus*, *Peromyscus*, *Reithrodontomys*, *Scalopus*, *Sylvilagus*, and *Taxidea*. Type specimens in the mammal collection now number 1,325. The mammal laboratory was utilized by 130 research workers other than Bureau employees from 27 States and 1 foreign country. An account of the mammal collection was given in a Wildlife Leaflet (BS-153), and the following additional leaflets were issued relating to biological surveys and other work basic to wildlife conservation: Big-game Inventory of the United States, 1938 (BS-142), Raising Deer in Captivity (BS-144), Status of the American Bison in the United States and Alaska, 1939 (BS-148), and Suggested Action for Sportsman's Organizations (BS-152).

ECONOMIC RESEARCH ON WILDLIFE

WATERFOWL-MANAGEMENT INVESTIGATIONS

Waterfowl-Nesting Studies

As a basis for determining the factors affecting waterfowl production on national wildlife refuges, nesting studies were conducted on the following refuges: Crescent Lake, Nebr.; Bear River, Utah; Malheur, Oreg.; Lacreek, S. Dak.; Valentine, Nebr.; and Lower Souris, N. Dak. These indicated that depredations by bull snakes, skunks, ravens, magpies, and California gulls continued to be an important menace to the welfare of nesting waterfowl.

Ecological and Management Studies

In surveys made in Utah important factors limiting the production of aquatic vegetation were found to be salinity, turbidity, absence of organic muck, receding water levels, and the wave action caused by strong winds. Transplanting demonstrated the value of saltgrass (*Distichlis stricta*) and saltbush (*Atriplex hastata*) as cover plants for soils where high concentrations of soluble salts preclude most other growths, except foxtail (*Hordeum jubatum*), which has some objec-

tionable qualities. Duck-food plants found to have a wide salinity tolerance are hardstem bulrush (*Scirpus acutus*) and glasswort (*Salicornia rubra*).

Succession of vegetation on artificial banks over the past four years was correlated with nesting utilization by waterfowl, and it was learned that the pioneer stages were best suited to nesting. Studies showed that while artificial islands were not utilized by ducks and geese, 4 of these islands held 1,580 California gull, 14 cormorant, and 66 Caspian tern nests. Muskrats were found beneficial in making ponds in dense emergent growth, and on one area as high as 45 percent of all goose nests located during four years were on muskrat lodges.

A technical report on the alluvial marshes and swamps of Louisiana was prepared for publication. Experimental burning of marshes on the Sabine and Lacassine Refuges, La., indicated the importance of fire as a management tool. It was estimated that more than 500,000 geese used these burned areas. Livestock grazing prolonged the value of burns.

Management studies at the Malheur Refuge, Oreg., showed that giant burreed (*Sparganium eurycarpum*) was benefited rather than retarded by disking, that deep water impoundments favored the growth of hardstem bulrush (*Scirpus acutus*), and that mowing and grazing of wet meadows properly handled instead of noticeably hindering waterfowl breeding proved beneficial during fall, winter, and early spring by keeping the meadows open as foraging places for the birds.

Reconnaissance of Refuges and Refuge Sites

Reconnaissance was made of possible refuge sites in New England, particularly in Massachusetts, where past surveys showed the need for a major waterfowl area to round out the national wildlife refuge system along the Atlantic Flyway. Studies of wildlife problems were made on the Santee-Cooper power and navigation project, South Carolina; at Reelfoot Lake, Tenn.; on the Tobay Bird Sanctuary, N. Y.; in Shinnecock Bay, Long Island, N. Y.; in Ottawa and Lucas Counties, Ohio; in Mobile Bay, Ala.; in Pepin and Pierce Counties, Wis.; at Catahoula Lake, La.; on the Gilbertsville Reservoir, Tenn.; and on the Wheeler Refuge, Ala. With a view to assisting in the application of research findings in refuge development, surveys also were conducted on various other Federal refuges under the administration of the Bureau, including the following: White River, Ark.; Kentucky Woodlands, Ky.; Bombay Hook, Del.; Pea Island, N. C.; Noxubee, Ala.; and numerous other units.

Suppression of Waterchestnut

Studies to develop methods for suppressing the waterchestnut on the Potomac River were continued. Various chemicals and cutting devices were tried out in cooperation with the War Department and the C. C. C., and chemical tests were made with the assistance of a private industrial concern. The results of the mechanical control carried out last year were checked and found favorable, with only a minimum of follow-up work necessary. The job of completely eradicating the pest, however, becomes of greater magnitude each year. State authorities in New York were advised regarding waterchestnut control on the Mohawk River.

Canada Goose Management Studies

In Utah, Oregon, and California, studies of Canada geese and the factors influencing their increase were continued. A trap was designed and used in banding 1,263 wild geese on the Bear River Refuge, Utah, and a method of shipping the birds under adverse summer conditions was worked out. Experimental transplantings of young geese were made at four midwestern refuges and reports indicate that the birds will serve as nuclei for future breeding populations. Field studies were made of the feeding habits of geese in the Great Basin and in the Northwest.

Redhead Duck Management Studies

The tendency of redhead ducks to lay eggs in the nests of other birds was noted on the breeding grounds of the Bear River Refuge as an important contributing factor in the failure of the redhead population to recover promptly from disasters. In heavily shot-over habitats lead poisoning was found an important cause of mortality during certain seasons. Most of the redheads leave the breeding grounds by the opening of the shooting season, so the hunter kill is low on northern Utah marshes. A map was prepared showing the migration routes and concentration areas in the United States of redheads banded at Bear River.

MOSQUITO CONTROL IN WILDLIFE HABITAT

A detailed experimental project, set up at the Bombay Hook Refuge, Del., in an attempt to demonstrate methods least injurious to wildlife habitat for the control of saltmarsh mosquitoes, common along the Atlantic and Gulf coasts, resulted in an encouraging reduction of mosquito breeding and in an improvement of the area

for waterfowl and other aquatic life. At the Wheeler Migratory Bird Refuge, Ala., where many large impoundments have already been made, cooperative studies with the Tennessee Valley Authority, Bureau of Fisheries, Public Health Service, and Bureau of Entomology and Plant Quarantine have been under way during two summers, with the objective of coordinating more effectively necessary mosquito control with refuge management and wildlife conservation.

LABORATORY RESEARCH ON FOOD HABITS

A summary of laboratory investigations of food habits is contained in table 2, which shows that 6,264 unit analyses were made representing 147 species of amphibians, reptiles, birds, and mammals. In addition, many identifications of plants and plant parts, insects, reptiles, bones, and hairs were made for various institutions and research workers engaged in wildlife investigations.

TABLE 2.—Wildlife food analyses made in 1940, showing by class the numbers of species and units examined

Class	Stomachs		Pellets		Seats		Food remains ¹ from—				Total	
							Nests		Dens of mammals			
	Species	Units	Species	Units	Species	Units	Species	Units	Species	Units	Species	Units
Amphibians ..	1	4									1	4
Reptiles.....	11	286									11	286
Birds.....	87	2,632	9	701			2	40			98	3,373
Mammals.....	30	1,429	1	30	5	1,110			1	32	37	2,601
Total...	129	4,351	10	731	5	1,110	2	40	1	32	147	6,264

¹ Numbers represent units of material.

Field observations were made in areas in Arizona where band-tailed pigeons were abundant, analysis of 382 stomachs was completed and the results were tabulated, and a manuscript on a preliminary study of the habits, food, and economic status of these birds was completed.

COOPERATIVE FOOD HABITS RESEARCH

Investigations of Wildlife Research Units

Cooperative research on the food habits of birds, mammals, and reptiles was conducted with 8 of the 10 cooperative wildlife research units, and 1,632 unit examinations representing 19 species were made. The Alabama and Virginia units detailed student assistants to make analyses in the food habits laboratory at Washington, D. C., where large reference collections and laboratory facilities are available.

Aid to Federal, State, and Other Agencies

For the Forest Service, 333 unit examinations of 13 species of animals was made and a paper published on the early winter food habits of the black bear in the George Washington National Forest; for the Soil Conservation Service, 116 bird stomachs of 22 species were analyzed; and for the Public Health Service, National Park Service, Bureau of Animal Industry, and the Tennessee Valley Authority, various stomach and pellet examinations were made.

A collaborator assigned by the Conservation Department of New York examined stomachs of 296 ruffed grouse and 82 ring-necked pheasants collected in that State. Analyses made by the Bureau for other State agencies were as follows: Texas Game, Fish, and Oyster Commission, stomachs of 36 house cats, 11 white-tailed deer, and 10 turtles and 19 otter scats; Michigan Commission of Conservation, 111 stomachs of 5 species of predatory animals and 81 otter scats; Alaska Game Commission, 34 coyote stomachs; California Department of Natural Resources, 54 stomachs of 5 species of predatory animals; Colorado State Game and Fish Commission, 4 house cat stomachs; Montana State Fish and Game Commission, 13 great blue heron stomachs; Nebraska Game, Forestation, and Parks Commission, 4 ring-necked pheasant stomachs; New Mexico State Game and Fish Commission, 29 merganser stomachs; Vermont Department of Conservation and Development, 51 bobcat stomachs. Stomachs of 25 mule deer and of 44 predators of 4 species were analyzed for various States in connection with the Federal aid in wildlife restoration projects, and 56 California quail stomachs were examined for the California Quail Committee. Special examinations made for private individuals and agencies included 391 unit examinations of 36 species and subspecies of birds and 92 unit examinations of 1 species of mammal.

NEW FOOD HABITS LABORATORY AT PATUXENT RESEARCH REFUGE

The Food Habits Laboratory maintained at Washington, D. C., since 1885 was transferred in June to the Patuxent Research Refuge, Bowie, Md., where there was recently completed a 3-story brick building with two floors devoted to laboratories, administrative offices, and library, and the third to scientific collections, equipment, and supplies, where also a modern greenhouse is available for use in studies of wildlife food propagation, and where there is opportunity to work with aquatic plants on the recently created impoundment known as Cash Lake. The new laboratory is named in honor of C. Hart Merriam, the first Chief of the Biological Survey.

The first research contribution from this refuge was issued under the title "Flora of the Patuxent Research Refuge, Maryland" (Wildlife

Leaflet 154, processed). It contains a detailed list of the plants and information about the size, topography, water supply, geology, and soils of the refuge.

STUDIES OF NUTRITION AND PHYSIOLOGY OF UPLAND GAME BIRDS

Cooperation was continued with the Bureau of Animal Industry, United States Department of Agriculture, in bobwhite studies to determine the nutritional requirements of the bird, the nutritive qualities of its native foods, and the effect of various levels of protein intake on its live weight, food consumption, and reproduction. Food selectivity tests were made and mortality problems studied in experiments with 816 young quails to determine the proportion of protein that gives optimum growth and lowest mortality. The nutritive value and palatability of acorns and wild beans and the seeds of lespedeza, black locust, ragweed, crabgrass, and bullgrass were studied in an experiment with 264 adult birds during the winter. A liberation study to determine the survival of captive-reared quails under natural conditions was begun in the fall. A Wildlife Leaflet (BS-163), Common Salt as a Curative for Cannibalism Among Game Birds in Captivity, was distributed and a manuscript on bobwhite quail propagation was completed for publication. The Virginia Polytechnic Institute at Blacksburg cooperated by assigning a collaborator to work out the chemical composition of certain native quail foods. Studies were also initiated to determine the vitamin A content of acorns.

Studies of the physiological activities and metabolic reactions of upland game birds, conducted in cooperation with Cornell University and the New York Department of Conservation, were devoted largely to the designing and constructing of equipment, the most important being a special calorimeter cabinet in which temperature, light, humidity, and air movement are automatically recorded and controlled.

STUDIES OF INJURIOUS BIRDS

Robin and Oriole Damage to Grapes

Investigation of complaints of depredations by robins and Baltimore and orchard orioles on grapes in vineyards near Omaha, Nebr., disclosed that the number of farmers suffering losses was small, but that on some vineyards damage was done to as much as 20 percent of the crop. Experiments involving trapping and shooting and investigations of the use of various frightening devices indicated that the latter may afford relief.

Crow Depredations on Nesting Game Birds

An analysis of 143 returns from 714 crows banded and released in Oklahoma during the winter of 1935-36 indicated that a large part of the crows wintering in Oklahoma breed in Canada and the Northern States, and therefore local crow control cannot have any appreciable effect on crow depredations on nesting Oklahoma game birds as alleged by promoters of widespread winter crow control in the State.

Sandhill Crane Damage to Grain

Sandhill cranes are wintering apparently in increasing numbers in eastern and southeastern New Mexico, where sorghums, Indian corn, and other small grains comprise much of the cultivated crops. Field investigation has shown that while complaints of damage have some justification, there is a marked variation from year to year in the number of birds present and in the resultant damage. Since the birds are daylight feeders and are easily frightened by gunfire, driving them away locally under proper safeguards and restrictions seems a practical way of preventing this damage.

Duck Injury to Peas and Grain

Ducks wintering in the San Luis Valley, Colo., have at times been the subject of no little complaint because of their feeding on peas left in the fields. To learn their status in winter in this valley, about 330 ducks of 4 species were banded. An appraisal also was made of damage by ducks to grain in northeastern Colorado. Field tests carried on to determine the effectiveness of certain frightening measures against waterfowl were followed by the issuance of a leaflet (BS-149) entitled "Protecting Field Crops From Waterfowl Damage by Means of Reflectors and Revolving Beacons."

Merganser Menace to Game Fish

In response to claims that mergansers were taking great quantities of game fish in the Rio Grande and Pecos Valleys of New Mexico, an investigation was made of the food habits of the birds. Stomach analyses revealed that on the upper Rio Grande the mergansers were not overly destructive to game fish but that they made bass and crappies more than 50 percent of their food on Elephant Butte Lake.

Other Bird-Control Activities

A restatement of Federal policies in bird control in the light of recent problems was presented before the Fifth North American Wildlife Conference in a paper on suggesting methods of approach. The method

suggested rests on the premise that much can be done to alleviate bird damage by the adjustment of cultural and harvesting practices in agriculture and that the farmer can best be approached through the State agricultural experiment station and the extension service.

Experiments in preventing crop damage or controlling birds injurious to crops in California continued and methods as yet incomplete were tested and species that had not before been successfully handled were studied. The third unit of a three-part manual on procedure and methods in controlling birds injurious to crops in California was completed and distributed to qualified county agricultural departments to enable them to handle bird complaints judiciously and conservatively. Leaflets issued on bird control included *Protecting Blueberries from Damage by Herring Gulls* (BS-141) and *Suggestions for the Control of Vagrant Domestic Pigeons* (BS-143).

RESEARCH IN THE CONTROL OF HARMFUL MAMMALS

To apply effectively measures for the control of injurious species of mammals it is necessary not only to perfect new traps and better lethal agents but to know the habits of the wild animals with which the farmer and stockman frequently have to contend. The Wildlife Research Laboratory at Denver continued its studies of the life habits of the pine mouse, meadow mouse, mole, porcupine, and woodchuck as a basis for developing improved control methods, as well as those on the use of fumigants and repellents in control practices and methods of application.

Predator Studies

Further experimental work to improve traps and trapping technique and to determine the efficacy of other devices and methods for taking predatory animals was conducted. Studies were continued to determine the relationship to predation of the seasonal drift and other natural habits of coyotes to their predatory tendencies and methods of control.

Repellent Experiments

The control of certain species of injurious animals in many instances can be accomplished through the use of a repellent instead of lethal baits. Noteworthy advances have been made in developing sprays and paints for the protection of trees against rabbit depredations. Sprays reduced the rabbit damage to a stand of pine seedlings in Louisiana and Texas from 35 to 3 percent and to tree plantings in a South Dakota silvicultural experiment from 24.8 to 7 percent. Studies concerned with the development of an inexpensive spray that will withstand adverse weather conditions are being continued.

Laboratory Investigations

Studies were conducted to develop a method to concentrate the active principle of red squill to standardize powders of varying toxicity for use in rat control. In cooperation with the University of Beirut, at Lebanon, Syria, studies were continued to determine the relationship of the toxicity of squill bulbs to growing and cultural conditions, and in cooperation with the New Mexico A. and M. College experiments were inaugurated in growing squill bulbs in this country.

FUR-ANIMAL CONSERVATION AND RESTORATION

FUR PRODUCTION AND THE FUR TRADE

War and the Fur Trade

War conditions have made imports and exports of furs more difficult and have called former trappers in foreign countries into the military service. As the shortage of fur imports increases and domestic markets depend more and more upon American production, larger numbers of native fur animals will be needed to meet the demand. To maintain our own source of supply will necessitate limited trapping, shorter seasons, and Federal, State, and individual cooperation in the production and conservation of fur animals. A deeper realization of the purpose and possibilities of producing more fur animals on State and Federal lands and on fur farms is being developed.

Fur Supply and Annual Take

The trapping required to supply the Nation's \$50,000,000 fur market indicates that the consumption of furs in the United States is exceeding the annual production. The danger of depleting this great natural resource was stressed by the Secretary in a statement based on available figures on the national annual take of fur animals, which emphasized that the data are not accurate enough to maintain a careful check on the situation. Lack of authentic information on the numbers and origin of animals trapped annually in the United States and on the number of domestic furs marketed prevents an intelligent estimate of the annual harvest. The States cannot undertake effective management of their fur resources until they require reports on the extent of the season's trapping, as a basis for assembling accurate data relative to the populations of the animals.

Silver Fox Quota

The outbreak of the European war would have forced out of business nearly all the silver fox farmers in the United States had not prompt action been taken to prevent the dumping of Canadian and European

pelts on the American market. Recognizing the situation as the most critical in the 30-year history of American fur farming, the Secretary called to the attention of the Committee for Reciprocity Information the possibility that a flood of foreign furs would undermine the American industry. Conferences between representatives of fur farmers and various Government officials followed, and a Supplementary Trade Agreement between the United States and Canada was negotiated on December 30, 1939, establishing an import quota of 100,000 silver foxes, including both live animals and pelts. Establishment of this limit not only maintained but increased the prices paid for silver fox pelts during the winter. The sale of a single Norwegian platinum fox pelt for \$11,000 and of an entire lot of 400 platinum skins for more than \$500 each gave impetus to the production of platinum and freakishly colored foxes in the United States. The Bureau of Customs decided that the platinum type of fox falls within the range of silver foxes as recognized in the United States and is therefore dutiable and comes within the import quota.

Selling Federal Furs

The national wildlife refuges are great reservoirs for fur-animal life, and the restoration and development of this natural resource, based on research, are elements essential to their management. A definite policy was established for handling and disposing of all furs that become surplus property of the refuges, and a system of selling is being devised that will supply valuable information in the fur-research field, return a maximum revenue to the Government, and reduce administrative details.

COOPERATIVE INVESTIGATIONS

Reproduction Studies

Minks.—In studies on the reproductive cycle of fur animals conducted in cooperation with the Bureau of Animal Industry of the United States Department of Agriculture, Swarthmore College, and the Carnegie Institution of Washington, a colony of 27 minks was maintained at Swarthmore College for intensive study. A number of articles published officially, and otherwise, reported the results of these researches.

Foxes.—Studies of female silver foxes were correlated with whelping and breeding records. During the breeding season 10 females and 5 males were used for intensive studies on reproduction. Electric-current requirements for killing foxes to be pelted were studied in cooperation with Swarthmore College.

Muskrats.—Reproductive tracts of 72 male and 55 female muskrats taken during the trapping season were examined and 1,050 histological sections prepared.

Nutritional Studies

Nutritional research on fur animals was conducted cooperatively with the Bureau of Animal Industry of the United States Department of Agriculture and Cornell University. In metabolism experiments with silver foxes and minks, continued from last year with different feeds, minks were found to digest cooked starch and grains more readily than raw, and this trait is being studied also for silver foxes. Foxes digest about 10 percent more of a given feed than minks, probably because of their longer digestive tracts. To establish a normal standard for the comparison of pathological cases, analyses were made of the blood of both foxes and minks.

The principal nutritional problem studied was on the vitamin requirements of fur animals. Preliminary work with adult animals indicated that sufficient body reserve of vitamins A and D may be stored for summer use by spring feeding of diets rich in these vitamins. Results obtained from feeding to adult minks rations containing no vitamin C indicated that this vitamin is not essential for maintenance of their health, but further work is necessary to determine whether fur quality, breeding ability, or special functions are affected by its absence. Other experiments indicate that calcium and phosphorus are essential during the reproduction and lactation periods of foxes and minks and that fur breeders should supply feeds containing sufficient vitamin D.

Fur-fiber Investigations

In cooperation with the Bureau of Animal Industry of the United States Department of Agriculture, much time was devoted to a study of fur fibers. Silver fox and mink furs have three main types of fiber—the underfur and the regular and single guard hairs, and all three types differ from each other in relative length, form, surface structure, and distribution with respect to the follicles.

Through the cooperation of scientists of the Bureau of Standards, an instrument has been constructed for measuring gloss, in order to correlate it with what the eye recognizes as luster.

Technical analysis of the structure of fibers of Karakul and other sheep led to the discovery of smaller units of structure than previously recognized, namely, spherical keratin particles less than 1 micron (one twenty-five thousandth inch) in diameter that may bear pigment and are arranged systematically. The clarification of such minute details of structure is fundamental to the understanding of the gross characteristics of the fibers, which in turn determine the quality of furs.

Karakul Sheep Studies

The Karakul sheep study was continued in cooperation with the Bureau of Animal Industry at the Agricultural Research Center at Beltsville, Md., where the experimental herd produced 59 lambskins. These were cut into halves, half of which were dressed and dyed and the other half left in the raw state to determine the effect that processing has on shape and size of curl, luster, and other qualities. These lambskins were also graded and valued according to standard samples, first by the cooperators and then by fur-trade specialists.

FUR ANIMAL EXPERIMENT STATION, NEW YORK

One of the major problems studied at the Fur Animal Experiment Station, Saratoga Springs, N. Y., was to find cheaper substitutes for meat in the rations of fur animals. This quest becomes more important each year in the case of silver foxes as the prices for pelts are still declining. Beef meal fed in summer was satisfactory and the animals developed good fur. The work demonstrated also that soybean meal can replace the usual weight of beef meal with good results, and the possibility was studied of feeding tripe, udders, lungs, and other packing-house offal. The summer feeding of foxes exclusively on a dry ration in the form of cubes or pellets was tested toward the end of the year. In mink-feeding experiments, canned fish, fishmeal, and tripe were used as substitutes for raw meat and satisfactory results obtained at a much lower cost.

Construction work at the station begun by the W. P. A. was completed, and a new project was begun near the end of the year to provide a residence, additional laboratory facilities, refrigeration unit, heating plant, and new fur-animal pens.

RABBIT EXPERIMENT STATION, CALIF.

That a protein supplement to the grain-hay ration is a necessity for producing rabbits economically was demonstrated by tests with 240 does and 1,636 young rabbits fed for 30 months on peanut, soybean, hempseed, and linseed meals, at the Rabbit Experiment Station, Fontana, Calif. Rations having a narrow nutritive ratio (proportion of digestible protein to total digestible carbohydrates and fats) were found most satisfactory. The pea-sized cake, or pelleted form, of these meals were best adapted for preparing mixtures with grains and for self-feeding.

For 25 months, 48 does and 1,813 young were fed to determine the value of a ration in which cereal grains were limited, and the results proved that feed mixtures for does and litters may consist of one or

more cereal grains properly balanced with the plant protein supplements. Choice of oats, wheat, barley, and sorghum in the feed mixture depends upon the quality and relative cost.

In a 5-year experiment in self-feeding does and litters, now completed, rabbits demonstrated their ability to balance their own rations when given free choice of adequate feeds. Self-fed fryer rabbits, weaned at 56 days of age, averaged 6.8 percent heavier and required 15 percent less feed to produce a unit of gain in live weight than rabbits hand fed a comparable ration.

FUR ANIMAL FIELD STATION, MARYLAND

On the Blackwater Refuge, Maryland, the fur animal field station is developing knowledge on populations, carrying capacity, permissible annual take, breeding season, prime-fur period, and other factors in fur-animal management. A count of the muskrat houses on the 5,248 acres of marsh revealed 26,631 inhabited and 3,947 feed houses. The number of lodges ranged from 3.5 to 9.31 per acre and averaged 5.8. The ratio of feed houses to inhabited lodges was 1 to 6.6.

Extremely cold weather in March delayed the muskrats' breeding period and the growth of plants on the marsh. The first evidence of breeding was noted during the latter part of April, when the green shoots of the three-square also were observed. Litters were born on the marsh at the beginning of April and in pens during the latter part of that month. Two cases of mutation in the brown Maryland muskrat were found, the variety being devoid of guard hairs and having the short underfur wavy and of fine texture and good sheen. Contestants from various States were entered in a muskrat-skinning contest, promoted by the director of the station and held in a theater at Cambridge, Md. The winner removed five pelts in 2 minutes and 38 seconds.

Muskrats and other fur animals are maintained in pens of various sizes and kinds for research purposes. Reproduction in the pens this year was satisfactory, a total of 20 litters being produced. The study to determine the palatability of various feeds for muskrats is being continued. Two female and one male nutria were purchased. A litter was produced and there are now 9 mature animals and 4 young at the station.

WILDLIFE-DISEASE RESEARCH

FUR-ANIMAL DISEASE CONTROL

Research on definite strains of distemper in silver foxes and minks revealed specific qualities of the viruses, tests on the viability of which show a ready susceptibility to injury by light and ordinary

drying; rapid freezing at low temperatures in vacuo, however, permits storage of specific strains with retention of virulence. Advantage was taken of this proved susceptibility of the virus to natural destruction in the eradication of disease from ranches by temporarily protecting all the stock with homologous serum until no live virus remained.

Control of outbreaks of paratyphoid in silver fox herds has been simplified by use of commercial livestock paratyphoid vaccine. Previously it had been considered safe to use only an autogenous product developed from the particular strain existing in the herd to be treated.

Study of a new disease in minks, known as "cotton" mink, showed that the under fur assumes a pale shade, almost white, making the pelt practically worthless. A relationship between the defective pelage and the abnormal functioning of the digestive process was noted in affected animals.

GAME-BIRD DISEASES

Through extensive use of the Winkler method of oxygen determination and toxicity tests with experimental animals, a close relationship between oxygen depletion and outbreaks of botulism in waterfowl was demonstrated. Tests showed that this reduction in oxygen is brought about by the growth of aerobic organisms during the early stages of decay of plant and animal matter on the shore lines of lakes. Experiments are being conducted with various devices for instilling oxygen into the water to inhibit the multiplication of the botulinus organisms.

PHYSICAL PROPERTIES OF QUAIL FEEDS STUDIED

Extensive losses among young pen-raised quails were shown to be due to excessive quantities of fiber causing impaction in the digestive canal. This finding makes it evident that nutritive values alone are not to be relied upon in developing a ration for young quails but that the physical properties of feeds also must be given careful consideration.

INFECTIOUS DISEASES IN BIG GAME

Assistance was given the Forest Service of the United States Department of Agriculture in diagnosing an outbreak of hemorrhagic septicemia in deer and making recommendations for its control. In numerous autopsies, the bipolar germ characteristic of the disease was demonstrated in the blood.

In cooperation with the Bureau of Animal Industry of the United States Department of Agriculture and the veterinary staff at Fort Sill, Okla., diagnosis was made of Bang's disease in the buffaloes and long-horned cattle on the Wichita Refuge on the basis of the blood tests. Control by vaccinating the young stock was recommended.

RESEARCH ON NATIONAL PARK WILDLIFE

WILDLIFE RELATIONSHIPS

On January 1, 1940, the wildlife research work formerly done by the National Park Service was transferred to the Bureau of Biological Survey, by direction of the Secretary. Since that date, continuing work begun several years ago, major emphasis has been placed upon investigations of prey-predator ecology. Field work was centered on wolf-sheep problems in Mount McKinley National Park, Alaska, to which a biologist who spent 7 months there in 1939 returned for a second season. His laboratory studies of field material, carried on during the winter, have not progressed far enough to warrant publication of conclusions, but they indicate that climatic and range conditions are greater factors than predation by wolves in the fluctuations of the Dall sheep populations.

A closer coordination among all research agencies working on bighorn sheep in the Rocky Mountains was effected through agreements between the National Park Service, the Grazing Service, and the Bureau of Biological Survey, of this Department, the Forest Service, of the Department of Agriculture, and the States concerned. A consequent improvement in assembling and distributing data has resulted in more effective efforts to conserve this endangered species. Contribution from national park areas to this cooperation has come from Rocky Mountain National Park, Colo., where the dietary and mineral requirements of bighorns are being investigated; from Yellowstone National Park, Wyo., where migration and range are being studied by the naturalist staff; and from the Glacier National Park, Mont., where the regional biologist and the park staff are making observations upon lambing-range requirements and improvement. Inventories in Death Valley National Monument, Calif., show a gradual improvement in the status of the Nelson bighorn but indicate a need for eliminating stray cattle and burros. Similar range competition is found to be imminent on the Boulder Dam National Recreational Area, Nev. Studies in the Organ Pipe Cactus National Monument, Ariz., show that distribution of water holes may be the present limiting factor in the conservation of the Gaillard bighorn.

Other inventories included a survey of the botanical resources of Mount McKinley National Park, through cooperation of the Univer-

sities of Wyoming and Alaska; preliminary surveys in California of wildlife on the new Channel Islands and Joshua Tree National Monuments; and in Utah, at Capitol Reef National Monument.

Other research projects included a study of mosquito-control methods on national park areas in the Southeastern States, resulting in recommendation of pyrethrum in preference to fuel oil as a larvicide; studies of reported overpopulations of deer on the Hickory Run Recreational Demonstration Area, Pa., and of deer, wild turkeys, and raccoons on the Colonial National Historical Park, Va.; appraisal of wildlife habitats along the Blue Ridge Parkway; investigation of mixed-type habitats versus solid forests in southeastern areas; continuance of surveys of the trumpeter swan in Yellowstone National Park; and observations of forage utilization by elk, deer, bighorns, and beavers in Rocky Mountain National Park.

RANGE-IMPROVEMENT STUDIES

Investigations of methods for improving forage conditions were continued in Rocky Mountain National Park, where the effect of heavy elk browsing, especially on aspen, is being studied in relation to use of the same food by deer and beavers. Resultant recommendations for a reduction in the size of the elk herd are now being carried out by the National Park Service. Long-term range studies were also continued by the use of exclusion plots on the floor of Yosemite Valley, Calif., where deer are numerous; and in Zion National Park, Utah, where a recommendation for the removal of about 50 surplus deer has been made. Overbrowsing by deer was investigated also in several small eastern areas, including Hickory Run and French Creek Recreational Demonstration Areas, Pa., and Colonial Historical Park, Va. In the Pennsylvania areas overbrowsing will be corrected or prevented under a recent agreement, approved by the Secretary, whereby the National Park Service and the State Game Commission will cooperate in regulated hunting on such demonstration areas as require management measures to preserve recreational values; in Virginia overabundance of deer in the Colonial Park is being handled in cooperation with the State by live trapping surplus animals and transplanting them to understocked sections.

Dual use of range by wildlife and domestic stock was investigated in several national park areas where to avoid hardship to cattlemen land-acquisition agreements provide for a continuance of grazing for a limited period. As a result of these studies the following management practices have been adopted by the National Park Service:

Through an agreement with the Grazing Service, approved by the Secretary on February 20, 1940, grazing privileges are being expedi-

tiously handled by fieldmen of both services on the basis of gradual reduction and eventual elimination on Carlsbad Caverns National Park addition, N. Mex.; Grand Canyon National Monument, Ariz.; Zion National Monument, Utah; and Dinosaur Monument addition, Utah and Colorado. Areas adjacent to forest reserves, including Bryce Canyon National Park, Utah, and Kings Canyon National Park, Calif., are receiving similar tapering-off management. Other plans affecting grazing contemplate the eventual removal of saddle horses from a bighorn lambing ground in Glacier National Park; elimination of stray cattle and feral burros from important bighorn ranges in the Death Valley National Monument; and improvement of water holes for antelopes in the White Sands National Monument, N. Mex.

BIOLOGICAL SURVEYS AND WILDLIFE INVENTORIES

In Sequoia National Park, Calif., a comprehensive faunal survey has been completed and a report on the field work partly prepared for publication. Field and laboratory work on a similar survey of the new Kings Canyon National Park was begun in the spring. Improvements in making and recording annual wildlife inventories in the national parks have rendered the data more usable in management and publicity projects. The results of the improved inventory were published in Conservation Bulletin 3, *Wildlife Conditions in the National Parks*: 1939.

FEDERAL AID IN WILDLIFE RESTORATION

The satisfactory progress under the Federal Aid to Wildlife Restoration Act (50 Stat. 917), commonly known as the Pittman-Robertson Act, was continued and expanded during its second year of operation. Having become better acquainted with its provisions, the States have been able to engage in well-studied restoration programs designed for the most part to benefit all sections, and their activities have already accomplished much for wildlife. Information on the program and the text of the law and regulations were published in *Wildlife Circular 3*.

All 43 of the eligible States (5 have not enacted the necessary legislation to provide for their participation—Florida, Georgia, Louisiana, Montana, and Nevada) are now engaged in wildlife-restoration projects, the nature of which varies greatly. Some of the Eastern and Southern States have acquired large tracts to provide additional sanctuaries for deer, wild turkeys, ruffed grouse, and fur animals. Western States have emphasized the purchase of winter range for deer, elk, and other big-game species, and the provision

of additional water facilities for prairie chickens and sage grouse. Many States have inaugurated State-wide wildlife-resource surveys to inventory wildlife populations and ascertain limiting factors with the view of inaugurating better management procedures.

The conduct of these projects has afforded employment to a number of graduates of colleges that offer wildlife-management courses. The States find it advantageous to use trained personnel in their wildlife work, and the training courses available are recruiting others to careers in wildlife management. In their wildlife-restoration activities the States report splendid cooperation by other governmental agencies, including the Forest Service, Agricultural Adjustment Administration, Civilian Conservation Corps, Soil Conservation Service, Grazing Service, Bureau of Indian Affairs, and National Park Service.

Of the funds appropriated in 1939, the \$546,068 not expended was available for obligation, together with the current appropriation of \$1,500,000, of which \$1,400,000 was directly apportioned to the States. The Federal funds available for the States during 1940 thus amounting to \$1,946,068 were increased by the required 25-percent State contributions to \$2,594,757. The money is apportioned for wildlife-restoration projects on the basis of the land area and the number of hunting-license holders in each State. All costs of undertakings are borne by the State game departments, after which reimbursement is made from Federal funds for the Government's pro rata share, which may not exceed 75 percent of the total.

Approval of projects is limited to those of substantial character and design and of benefit to wildlife. The year's restoration program involved the obligation by the States of \$2,082,735 on 237 individual restoration projects—51 for the acquisition of land and water for wildlife, at an estimated cost of \$487,512; 101 for the development of land and water to improve wildlife conditions, at a cost of \$713,953; and 85 for the investigation of wildlife conditions and their relationship to existing agricultural and land-use practices, at an expenditure of \$881,270. The features of the restoration activities grouped for each State are shown in table 3.

The States cooperating plan to continue their programs for 1941 under the increased funds made available (Congress appropriated \$2,500,000). It is anticipated that the restoration program will be extended and expanded in proportion to this increase and to the increased ability of the game departments through experience gained in operations during the past 2 years.

TABLE 3.—Nature of the 1940 Federal-Aid-In-Wildlife Restoration Projects and the Estimated Cost

State; and total funds available	Purpose of project	Estimated cost
Alabama.....	To inventory the principal wildlife species.....	\$27, 120
\$46,015.	To establish muskrats and beavers in coastal marshes and streams.....	2, 134
Arizona.....	To survey the wildlife resources.....	44, 869
\$63,851.	To restore quails in suitable habitats.....	4, 356
	To establish beavers on forest lands.....	946
	To introduce pheasants in irrigated valleys of the Gila, Salt, and Verde River watersheds.....	1, 837
	To restore wild turkeys in national forests.....	2, 174
Arkansas.....	To construct headquarters facilities on State game lands in Howard County.....	15, 150
\$35,019.	To establish wild turkeys on State game refuges.....	5, 500
California.....	To study the management of the valley quail in the southern counties.....	7, 252
\$127,858.	To develop existing water supplies for quails and create new ones in desert areas.....	15, 000
	To restore springs, water holes, and habitat for sage grouse.....	10, 000
	To study limiting factors on mule deer in southern counties.....	12, 000
	To inventory the fur resources.....	9, 704
	To conduct a comprehensive study of beavers and their management.....	1, 600
Colorado.....	To survey the wildlife resources.....	29, 611
\$76,980.	To purchase deer winter-feeding area in Rio Blanco County.....	2, 150
	To acquire winter-feeding area for deer and elk in Gunnison County.....	20, 190
	To fence the Wray Upland Bird Refuge for prairie chickens, quails, and pheasants and improve the habitat.....	1, 615
	To purchase Hot Sulphur deer-elk winter-feeding grounds.....	3, 325
	To provide water facilities on Great Divide sanctuaries.....	3, 482
	To purchase big-game winter-feeding area on Fryling Pan River, Eagle County.....	8, 150
Connecticut.....	To study ruffed grouse management.....	4, 200
\$8, 574.	To fence the Scoville Wildlife Sanctuary for pheasants, grouse, and rabbits and improve the habitat.....	922
Delaware.....	To determine the value of seed-stock areas in maintaining wildlife.....	4, 659
\$4,685.		
Florida.....		(1)
\$41,990.		
Georgia.....		(1)
\$44,651.		
Idaho.....	To determine populations and distributions of the more important wildlife species.....	41, 936
\$61,206.	To purchase the Hagerman Valley Waterfowl Refuge.....	18, 045
	To improve waterfowl conditions on the Hagerman Valley Refuge.....	5, 302
	To purchase the Idaho County Bird Refuge.....	1, 130
	To fence and post the Idaho County Refuge and improve the wildlife habitat.....	684
	To purchase the Nez Perce Bird Refuge.....	1, 130
	To fence and post the Nez Perce Refuge.....	1, 665
	To develop 8 waterfowl areas for sage grouse in Lincoln and Minidoka Counties.....	3, 296
	To develop springs and water seeps for sage grouse.....	1, 048
	To reclaim 4 springs in Owyhee County for wildlife.....	1, 933
	To improve 3 springs for sage grouse and antelopes.....	1, 200
	To establish beavers in mountain streams in forest regions.....	14, 775
	To establish Hungarian partridges on depleted areas.....	1, 375
	To introduce pheasants on suitable depleted areas.....	2, 525
	To post 40 State refuges.....	3, 500
Illinois.....	To study upland-game management.....	3, 860
\$89,678.	To develop seed-stock refuges on farms.....	13, 603
	To investigate squirrels and raccoons.....	3, 725
	To study food supplies of upland game birds.....	2, 618
	To develop Horseshoe Lake for geese.....	12, 004
	To fence upland-game study areas and improve the wildlife habitat.....	2, 777
	To survey and select prairie areas suitable for conducting wildlife-management studies.....	2, 600
	To purchase the Green River Waterfowl and Upland Game Refuge.....	49, 837
Indiana.....	To fence the Hovey Lake Refuge and construct headquarters buildings and stabilize water levels.....	14, 365
\$113,933.	To conduct State-wide wildlife survey and game-management demonstration.....	38, 250
Iowa.....	To purchase the Rice Lake waterfowl and upland game area.....	30, 362
\$57,838.		
Kansas.....	To fence and post the Kingman County State Game Preserve and improve the habitat for pheasants, quails, and waterfowl.....	7, 881
\$58,012.	To stabilize water levels on the Republic County State Game Preserve.....	2, 500
	To fence the Finney County State Game Preserve for buffaloes and for lesser prairie chickens and other game birds.....	6, 791
	To restore and manage pheasants.....	15, 000

¹ Ineligible to participate.

TABLE 3.—Nature of the 1940 Federal-Aid-In-Wildlife Restoration Projects and the Estimated Cost—Continued

State; and total funds available	Purpose of project	Estimated cost
Kentucky..... \$41,703.	To purchase the Flatwoods Deer and Turkey Refuge..... To develop the Flatwoods Refuge..... To develop Harlan wildlife area for deer and turkeys.....	\$6, 070 2, 202 2, 572 (1)
Louisiana..... \$40,844.		
Maine..... \$37,844.	To determine means of developing the State's 2,500 lakes for waterfowl, fur animals, and other wildlife. To establish aquatic food and cover plants in some of the lakes.....	8, 535 19, 275
Maryland..... \$20,313.	To acquire the Indian Springs Game Refuge for quails, turkeys, rabbits, and squirrels. To fence and post the Indian Springs Refuge and improve the wildlife habitat. To fence and post wildlife-refuge parts of State forests and improve the wildlife habitat.	11, 114 3, 400 3, 250
Massachusetts..... \$20,016.	To conduct a comprehensive study of pheasant management on test and check areas. To investigate winter range and food conditions for black ducks and Canada geese. To develop areas on the Federation of Women's Club State Forest for rabbits, deer, and ruffed grouse. To improve wildlife conditions in the Windsor State Forest..... To improve wildlife conditions in the Hawley State Forest..... To improve wildlife areas for deer in the Myles Standish State Forest.....	8, 000 6, 000 600 350 1, 250 1, 200
Michigan..... \$173,878.	To ascertain habitat requirements of ring-necked pheasants..... To study habitat requirements of fox squirrels..... To study survival and behavior of Hungarian partridges..... To study ecological successions after forest fires..... To study coordination of wildlife with agricultural practices by practical experiments. To ascertain range competition between sharp-tailed grouse and prairie chickens. To study practical raccoon management..... To purchase an upland-game area in Barry County..... To purchase upland-game lands in Tuscola County..... To purchase lands for the Rose Lake Wildlife Experiment Station..... To fence and post the Red Lake Refuge..... To post 114 State game refuges.....	6, 920 5, 330 7, 158 8, 500 10, 345 5, 500 4, 000 31, 345 16, 605 10, 125 4, 173 24, 803
Minnesota..... \$90,406.	To reestablish quails and pheasants on State refuges.....	17, 754
Mississippi..... \$47,257.	To improve wildlife conditions for deer, turkeys, and beavers in national forests. To fence the H. B. Cole Refuge, improve the wildlife habitat, and reestablish deer and turkeys. To fence the Leroy Percy Refuge and improve the wildlife habitat..... To determine populations and distribution of the wildlife resources..... To conduct a survey of the wildlife resources..... To purchase lands for deer and turkeys in the Ozark Mountains..... To fence and post the Caney Mountain Refuge in the Ozarks and improve conditions for deer and turkeys.	4, 712 13, 793 9, 111 11, 979 55, 500 9, 437 9, 938 (1)
Missouri..... \$69,467.		
Montana..... \$91,505.		
Nebraska..... \$70,084.	To increase and establish ring-necked pheasants..... To restore and improve conditions for quails.....	19, 868 26, 087 (1)
Nevada..... \$57,714.		
New Hampshire..... \$15,902.	To study ruffed grouse populations, needs, limiting factors, and management. To improve food and cover on experimental grouse-management areas..... To ascertain populations, species, and conditions of ducks..... To study and improve conditions for pheasants, grouse, ducks, and fur animals.	12, 869 4, 246 835 3, 000
New Jersey..... \$32,316.	To lease seed-stock refuges in Somerset County for pheasant and rabbit management. To acquire areas for deflecting deer from agricultural lands..... To study the condition of cottontail rabbits and recommend future management. To ascertain the value of seed-stock refuges for pheasants..... To improve food and cover on Somerset County seed-stock refuges..... To acquire 2 prairie chicken and quail refuges in Roosevelt County..... To fence the 2 Roosevelt County refuges and improve the water facilities..... To reestablish the antelope..... To improve water supplies for bighorn sheep..... To purchase 2 refuges in Taos County for sage grouse..... To purchase a refuge for wild turkeys, waterfowl, fur animals, and deer in Sandoval County.	1, 037 941 2, 279 5, 508 4, 428 6, 481 4, 072 8, 272 2, 420 8, 534 5, 506
New Mexico..... \$67,275.		

1 Ineligible to participate.

TABLE 3.—Nature of the 1940 Federal-Aid-In-Wildlife Restoration Projects and the Estimated Cost—Continued

State; and total funds available	Purpose of project	Estimated cost
New York..... \$169,676.	To post seed-stock refuges for farm game and improve the food and cover..... To lease seed-stock refuges for farm game..... To plant trees and shrubs on State lands for food and cover for deer, ruffed grouse, and cottontail rabbits..... To construct a pathological laboratory at the Delmar Research Center..... To study effective management practices for important species of game.....	\$10, 829 14, 446 7, 436 27, 206 53, 956
North Carolina..... \$59,755.	To develop the 70,000-acre Holly Shelter Wildlife Refuge..... To acquire lands for access to the Holly Shelter Refuge and for a headquarters site..... To survey farm-game management practices under field conditions..... To survey conditions for and to evaluate the fur resources..... To improve food and cover on the 40,000-acre Sandhills Wildlife Refuge..... To construct small water impoundments on the Sandhills Refuge..... To improve food and cover for deer and turkeys on the John Pickett Council Refuge.....	56, 920 7, 357 13, 581 8, 483 1, 826 9, 583 724
North Dakota..... \$39,423.	To fence the Dawson Refuge and improve cover and provide water..... To provide food and cover for waterfowl, Hungarian partridges, sharp-tailed grouse, and pheasants on the Cedar Lake Refuge..... To fence and post the Morton County Refuge and improve water conditions..... To purchase the Dawson Refuge..... To survey the wildlife resources.....	4, 631 1, 500 1, 769 3, 340 12, 300
Ohio..... \$133,857.	To survey the wildlife resources and correlate game management and existing agricultural practices..... To conduct grouse management and improve environment on Jackson County lands..... To study comprehensively grouse-management practices on selected areas..... To conduct grouse management on 1,400 acres in Washington County..... To restore and manage the bobwhite quail..... To survey the wildlife resources.....	38, 500 2, 188 13, 953 2, 625 42, 630 46, 435
Oklahoma..... \$54,386.	To establish seed-stock refuges for small game in the Willamette Valley..... To reseed parts of the Tillamook burn..... To establish and manage beavers..... To develop water supplies and habitat for sage grouse.....	7, 862 3, 000 10, 301 8, 060
Oregon..... \$66,042.	To establish and manage beavers..... To develop water supplies and habitat for sage grouse.....	10, 301 8, 060
Pennsylvania..... \$157,902.	To study forest-wildlife relations..... To study ecological conditions best suited for pheasants, Hungarian partridges, rabbits, and quails..... To study native fur animals..... To study the relationship of nutrition to reproduction among white-tailed deer..... To conduct an economic survey of muskrats, skunks, and foxes..... To recondition headquarters buildings at the Loyalsock Experiment Station..... To purchase 20 additional tracts for State game lands..... To investigate practicable game management.....	11, 385 5, 885 7, 625 7, 350 5, 850 2, 850 71, 155 2, 245
Rhode Island..... \$2,501.	To purchase the Buffalo Slough Waterfowl Refuge..... To acquire land for an upland-game refuge..... To fence the Cheatham County Refuge and provide deer-seed stock..... To investigate desert bighorns..... To survey the wildlife resources..... To restore the collared peccary..... To improve habitat for quails and reestablish the birds in depleted covers..... To establish the antelope on suitable depleted ranges..... To restore white-tailed deer and wild turkeys on suitable depleted ranges..... To study the relationship of beavers to stream run-off..... To purchase deer winter-feeding area in Box Elder County..... To study summer and winter feeding conditions for mule deer..... To purchase land and water rights for improving the Provo Bay Waterfowl Refuge..... To purchase the Cache experimental winter-feeding area for deer..... To improve waterfowl conditions in Ogden Bay by water impoundment..... To purchase lands in Millard County for deer winter range..... To survey the wildlife resources..... To study deer management..... To survey the fur resources along Lake Champlain..... To survey the wildlife resources..... To study the effect of forest clearings on wildlife..... To restore wild turkeys on protected areas..... To restore deer in the George Washington and Thomas Jefferson National Forests..... To restore the quail in counties east of the Blue Ridge Mountains.....	12, 361 17, 021 5, 414 4, 969 131, 055 1, 086 24, 255 2, 530 8, 202 1, 500 10, 185 11, 410 2, 115 2, 000 25, 860 8, 591 4, 000 1, 264 926 27, 000 3, 400 5, 000 19, 798 7, 220
South Carolina..... \$34,890.	To reestablish quails on improved areas in the Sumter National Forest..... To reestablish quails on improved areas in the Poinsett State Forest..... To purchase lands for the Gherkin Refuge for waterfowl, pheasants, and Hungarian partridges.....	2, 060 19, 259 6, 199
South Dakota..... \$46,118.	To purchase the Buffalo Slough Waterfowl Refuge..... To acquire land for an upland-game refuge..... To fence the Cheatham County Refuge and provide deer-seed stock..... To investigate desert bighorns..... To survey the wildlife resources..... To restore the collared peccary..... To improve habitat for quails and reestablish the birds in depleted covers..... To establish the antelope on suitable depleted ranges..... To restore white-tailed deer and wild turkeys on suitable depleted ranges..... To study the relationship of beavers to stream run-off..... To purchase deer winter-feeding area in Box Elder County..... To study summer and winter feeding conditions for mule deer..... To purchase land and water rights for improving the Provo Bay Waterfowl Refuge..... To purchase the Cache experimental winter-feeding area for deer..... To improve waterfowl conditions in Ogden Bay by water impoundment..... To purchase lands in Millard County for deer winter range..... To survey the wildlife resources..... To study deer management..... To survey the fur resources along Lake Champlain..... To survey the wildlife resources..... To study the effect of forest clearings on wildlife..... To restore wild turkeys on protected areas..... To restore deer in the George Washington and Thomas Jefferson National Forests..... To restore the quail in counties east of the Blue Ridge Mountains.....	12, 361 17, 021 5, 414 4, 969 131, 055 1, 086 24, 255 2, 530 8, 202 1, 500 10, 185 11, 410 2, 115 2, 000 25, 860 8, 591 4, 000 1, 264 926 27, 000 3, 400 5, 000 19, 798 7, 220
Tennessee..... \$36,659.	To purchase the Buffalo Slough Waterfowl Refuge..... To acquire land for an upland-game refuge..... To fence the Cheatham County Refuge and provide deer-seed stock..... To investigate desert bighorns..... To survey the wildlife resources..... To restore the collared peccary..... To improve habitat for quails and reestablish the birds in depleted covers..... To establish the antelope on suitable depleted ranges..... To restore white-tailed deer and wild turkeys on suitable depleted ranges..... To study the relationship of beavers to stream run-off..... To purchase deer winter-feeding area in Box Elder County..... To study summer and winter feeding conditions for mule deer..... To purchase land and water rights for improving the Provo Bay Waterfowl Refuge..... To purchase the Cache experimental winter-feeding area for deer..... To improve waterfowl conditions in Ogden Bay by water impoundment..... To purchase lands in Millard County for deer winter range..... To survey the wildlife resources..... To study deer management..... To survey the fur resources along Lake Champlain..... To survey the wildlife resources..... To study the effect of forest clearings on wildlife..... To restore wild turkeys on protected areas..... To restore deer in the George Washington and Thomas Jefferson National Forests..... To restore the quail in counties east of the Blue Ridge Mountains.....	12, 361 17, 021 5, 414 4, 969 131, 055 1, 086 24, 255 2, 530 8, 202 1, 500 10, 185 11, 410 2, 115 2, 000 25, 860 8, 591 4, 000 1, 264 926 27, 000 3, 400 5, 000 19, 798 7, 220
Texas..... \$158,632.	To purchase the Buffalo Slough Waterfowl Refuge..... To acquire land for an upland-game refuge..... To fence the Cheatham County Refuge and provide deer-seed stock..... To investigate desert bighorns..... To survey the wildlife resources..... To restore the collared peccary..... To improve habitat for quails and reestablish the birds in depleted covers..... To establish the antelope on suitable depleted ranges..... To restore white-tailed deer and wild turkeys on suitable depleted ranges..... To study the relationship of beavers to stream run-off..... To purchase deer winter-feeding area in Box Elder County..... To study summer and winter feeding conditions for mule deer..... To purchase land and water rights for improving the Provo Bay Waterfowl Refuge..... To purchase the Cache experimental winter-feeding area for deer..... To improve waterfowl conditions in Ogden Bay by water impoundment..... To purchase lands in Millard County for deer winter range..... To survey the wildlife resources..... To study deer management..... To survey the fur resources along Lake Champlain..... To survey the wildlife resources..... To study the effect of forest clearings on wildlife..... To restore wild turkeys on protected areas..... To restore deer in the George Washington and Thomas Jefferson National Forests..... To restore the quail in counties east of the Blue Ridge Mountains.....	12, 361 17, 021 5, 414 4, 969 131, 055 1, 086 24, 255 2, 530 8, 202 1, 500 10, 185 11, 410 2, 115 2, 000 25, 860 8, 591 4, 000 1, 264 926 27, 000 3, 400 5, 000 19, 798 7, 220
Utah..... \$54,433.	To purchase the Buffalo Slough Waterfowl Refuge..... To acquire land for an upland-game refuge..... To fence the Cheatham County Refuge and provide deer-seed stock..... To investigate desert bighorns..... To survey the wildlife resources..... To restore the collared peccary..... To improve habitat for quails and reestablish the birds in depleted covers..... To establish the antelope on suitable depleted ranges..... To restore white-tailed deer and wild turkeys on suitable depleted ranges..... To study the relationship of beavers to stream run-off..... To purchase deer winter-feeding area in Box Elder County..... To study summer and winter feeding conditions for mule deer..... To purchase land and water rights for improving the Provo Bay Waterfowl Refuge..... To purchase the Cache experimental winter-feeding area for deer..... To improve waterfowl conditions in Ogden Bay by water impoundment..... To purchase lands in Millard County for deer winter range..... To survey the wildlife resources..... To study deer management..... To survey the fur resources along Lake Champlain..... To survey the wildlife resources..... To study the effect of forest clearings on wildlife..... To restore wild turkeys on protected areas..... To restore deer in the George Washington and Thomas Jefferson National Forests..... To restore the quail in counties east of the Blue Ridge Mountains.....	12, 361 17, 021 5, 414 4, 969 131, 055 1, 086 24, 255 2, 530 8, 202 1, 500 10, 185 11, 410 2, 115 2, 000 25, 860 8, 591 4, 000 1, 264 926 27, 000 3, 400 5, 000 19, 798 7, 220
Vermont..... \$14,835.	To purchase the Buffalo Slough Waterfowl Refuge..... To acquire land for an upland-game refuge..... To fence the Cheatham County Refuge and provide deer-seed stock..... To investigate desert bighorns..... To survey the wildlife resources..... To restore the collared peccary..... To improve habitat for quails and reestablish the birds in depleted covers..... To establish the antelope on suitable depleted ranges..... To restore white-tailed deer and wild turkeys on suitable depleted ranges..... To study the relationship of beavers to stream run-off..... To purchase deer winter-feeding area in Box Elder County..... To study summer and winter feeding conditions for mule deer..... To purchase land and water rights for improving the Provo Bay Waterfowl Refuge..... To purchase the Cache experimental winter-feeding area for deer..... To improve waterfowl conditions in Ogden Bay by water impoundment..... To purchase lands in Millard County for deer winter range..... To survey the wildlife resources..... To study deer management..... To survey the fur resources along Lake Champlain..... To survey the wildlife resources..... To study the effect of forest clearings on wildlife..... To restore wild turkeys on protected areas..... To restore deer in the George Washington and Thomas Jefferson National Forests..... To restore the quail in counties east of the Blue Ridge Mountains.....	12, 361 17, 021 5, 414 4, 969 131, 055 1, 086 24, 255 2, 530 8, 202 1, 500 10, 185 11, 410 2, 115 2, 000 25, 860 8, 591 4, 000 1, 264 926 27, 000 3, 400 5, 000 19, 798 7, 220
Virginia..... \$50,527.	To purchase the Buffalo Slough Waterfowl Refuge..... To acquire land for an upland-game refuge..... To fence the Cheatham County Refuge and provide deer-seed stock..... To investigate desert bighorns..... To survey the wildlife resources..... To restore the collared peccary..... To improve habitat for quails and reestablish the birds in depleted covers..... To establish the antelope on suitable depleted ranges..... To restore white-tailed deer and wild turkeys on suitable depleted ranges..... To study the relationship of beavers to stream run-off..... To purchase deer winter-feeding area in Box Elder County..... To study summer and winter feeding conditions for mule deer..... To purchase land and water rights for improving the Provo Bay Waterfowl Refuge..... To purchase the Cache experimental winter-feeding area for deer..... To improve waterfowl conditions in Ogden Bay by water impoundment..... To purchase lands in Millard County for deer winter range..... To survey the wildlife resources..... To study deer management..... To survey the fur resources along Lake Champlain..... To survey the wildlife resources..... To study the effect of forest clearings on wildlife..... To restore wild turkeys on protected areas..... To restore deer in the George Washington and Thomas Jefferson National Forests..... To restore the quail in counties east of the Blue Ridge Mountains.....	12, 361 17, 021 5, 414 4, 969 131, 055 1, 086 24, 255 2, 530 8, 202 1, 500 10, 185 11, 410 2, 115 2, 000 25, 860 8, 591 4, 000 1, 264 926 27, 000 3, 400 5, 000 19, 798 7, 220

TABLE 3.—Nature of the 1940 Federal-Aid-In-Wildlife Restoration Projects and the Estimated Cost—Continued

State; and total funds available	Purpose of project	Estimated cost
Washington----- \$80,414.	To purchase lands for the Sinlahekin Deer Refuge.....	\$22, 286
	To protect the Sinlahekin Refuge from grazing by constructing fences and cattle guards.....	565
	To purchase an antelope range in Kittitas County.....	17, 565
	To fence and post the Squaw Creek Antelope Range and improve the habitat.....	5, 239
West Virginia----- \$51, 161.	To purchase an elk range in Yakima County.....	3, 554
	To purchase the Panther Creek deer and turkey refuge in McDowell County.....	37, 647
	To survey the wildlife resources.....	20, 000
	To reestablish deer on State refuges.....	9, 735
	To post, brush out boundaries, afford fire protection, and construct headquarters on the Nathaniel Mountain Wildlife Refuge.....	5, 116
	To fence and post the Braxton County Game Refuge and construct headquarters buildings.....	6, 183
	To post 6 State wildlife refuges.....	1, 375
Wisconsin----- \$81,442.	To study management problems of white-tailed deer.....	8, 800
	To study conditions for sharp-tailed and pinnated grouse and the management problems.....	8, 350
	To ascertain ways of improving waterfowl conditions.....	4, 600
	To survey pheasant populations and conditions.....	9, 400
	To study quail populations and the influence on them of climatic conditions.....	200
Wyoming----- \$53, 863.	To survey and restore sage grouse.....	13, 236
	To ascertain factors determining the abundance of bighorns.....	7, 350
	To purchase 2 winter-feeding areas for elk.....	10, 176

ACQUISITION OF LAND FOR REFUGES

Following approval by the Migratory Bird Conservation Commission of proposed acquisitions, 159 separate tracts, comprising 59,898 acres, were added to 20 existing national wildlife refuges throughout the country. These approvals involved relatively small units needed within existing boundaries to facilitate administration. Executive orders for the establishment of the Noxubee, Miss., and the Bosque del Apache, N. Mex., Refuges, for the enlargement of 4 existing refuges, and for one revocation involved 667.23 acres of public domain and 105,967.05 acres acquired by purchase. Details of the accomplishments in refuge-land acquisition are given in table 4.

Surveys were made of 294 miles of boundary lines and of 110 miles of interior or contiguous lines required by reason of lost and obliterated corners; 48 miles of level lines were run; 373 miles were marked to define the boundaries of existing refuges; and 115 miles of boundary lines were staked preliminary to fence construction. Survey descriptions necessary for title examinations and preparing deeds of conveyance for 827 tracts were completed for approximately 22,377 acres, of which 242 tracts of 8,356 acres with irregular boundaries were surveyed preliminary to the preparation of definitive land descriptions. Topographic surveys of 180 acres were made and detailed maps compiled therefrom.

TABLE 4.—Tracts, in acres, acquired or in process of acquisition for national wildlife refuges and related uses under the Migratory Bird Conservation Act, with emergency and other funds, and by gift and Executive order or proclamation

State and county	Refuge	Fiscal year 1940							Total	Acquired other than by purchase	Acquired in pre- vious years
		Under Migratory Bird Con- servation Act			With emergency and other funds						
		Acquired by pur- chase	Pending title con- veyance	Total	Acquired by pur- chase	Pending title con- veyance	Total				
Arizona: Mohave..... Arkansas: Arkansas, Desha, Monroe, and Phillips..... Delaware: Kent..... Florida: Jefferson, Taylor, and Wakulla..... Georgia: Jasper and Jones..... Idaho: Jefferson..... Illinois: Mason..... Carroll, Jo Daviess, Rock Island, and Whiteside..... Iowa: Kossuth..... Alamakee, Clayton, Clinton, Du- buque, Jackson, and Scott..... Kentucky: Lyon and Trigg..... Louisiana: Plaquemines..... Cameron..... Maine: Washington..... Maryland: Anne Arundel and Prince Georges..... Cecil and Harford..... Massachusetts: Barnstable..... Michigan: Schoolcraft..... Minnesota: Atkin..... Becker..... Houston, Wabasha, and Winona..... Mississippi: Noxubee, Oktibbeha and Winston..... Missouri: Stoddard and Wayne..... Charlton.....	Boulder Canyon (see also Nevada) White River..... Bombay Hook..... St. Marks..... Piedmont..... Camas..... Chautauqua..... Upper Mississippi (see also Iowa, Minnesota, and Wisconsin). Union Slough..... Upper Mississippi (see also Illinois, Minnesota, and Wisconsin). Kentucky Woodlands..... Delta..... Sabine..... Mooschohorn..... Patuxent..... Susquehanna (closed area) Monomoy..... Seney..... Rice Lake..... Tamarac..... Upper Mississippi (see also Illinois, Iowa, and Wisconsin). Noxubee..... Mingo..... Swan Lake.....	271 4 31 256 439 432 7,419 1,281 40 566	5,293 1,630 1,803 296 31 106 7,172 438 3,658 322 10,672 307 8,974 25,000 883	5,564 1,634 1,803 296 31 362 7,172 438 4,097 322 18,091 1,588 9,014 25,000	160 238 8,711 322 18,091 157 9,014 1,449	152 11,884 1,326 271 2,677 3,8,711 322 2,493 3157 72,493 1,449	1,312 3411,884 41,326 16,271 42,915 3,8,711 322 3157 2,493 1,449	5,876 1,634 13,687 1,326 296 302 362 2,915 15,883 438 4,097 432 21,210 322 18,091 1,745 9,014 2,493 38,239 25,000 1,449	312,047 2102,250 12,006 249,640 228,674 10,239 4,100 5,256 730 24,441 246,090 234,300 147,340 2417,165 2,693 268,067 9,714 22,914 14,478 9,221		

Montana:	Medicine Lake.....				345	1,898	3 2,243	2,243	21,275
Roosevelt and Sheridan	Red Rock Lakes.....				7,209		3 7,209	7,209	24,965
Nebraska:	Crescent Lake.....			720				7,720	42,629
Nevada:	Boulder Canyon (see also Arizona)	7		100					107
Clark:	Charles Sheldon (see also Oregon)	475		40					515
Humboldt:	Desert Game.....				320		3 320	320	581,709
Clark and Lincoln:	Ruby Lake.....			40					320
Elko and White Pine:	Brigantine.....	1,769		6,231					40
New Mexico:									35,578
New Jersey:	Atlantic.....								8,000
Chaves:	Bitter Lake.....	1,800		5,494					7,294
Socorro:	Bosque del Apache.....	3,044		3,044					3,044
New York:	Montezuma.....	101		907					52,843
North Dakota:									1,008
Foster and Stutsman:	Arrowwood.....			34					34
Burke and Ward:	Des Laes.....			9					248
Ramsey:	Lake Alice.....			12					12
Dunn:	Lake Ilo.....			2					6
Burleigh and Kiddier:	Long Lake.....	240							240
Burke and Mountrail:	Lostwood.....			6					6
Bottineau and McHenry:	Lower Souris.....	938		480					1,418
Renville and Ward:	Upper Souris.....	120		714					57,086
Rolette:	Willow Lake.....			1					30,872
Oregon:									1
Lake:	Charles Sheldon (see also Nevada)	627							627
Lake:	Hart Mountain.....			11,533					14,583
Harney:	Malheur: Malheur Unit.....	3,050		15,069					15,069
South Carolina:	Carolina Sandhills.....				561		4 11,336	11,336	93,487
South Dakota:									2 28,665
Brown:	Lake Andes.....			80					80
Tennessee:	Sand Lake.....				268		3 268	268	19,476
Lake and Obion:	Lake Isom.....			325			3 1,501	1,826	20
Texas:	Aransas.....			1,344				1,344	53,917
Washington:									
Stevens and Pend Oreille:	Little Pend Oreille.....						4 24,746	24,746	2 15,254
Skagit:	Skagit.....			400				400	400
Spokane:	Turnbull.....	784		1,460				2,244	8,665
Pacific:	Willapa Harbor.....	198		201				399	2,770

¹ \$950,000 fund, a substitute for Executive Order No. 6724.

² Corrected since last year.

³ Federal Emergency Relief Administration and Resettlement Administration funds.

⁴ Acquired and in process of acquisition by the Farm Security Administration; originally intended for agricultural demonstration areas, but transferred to the Biological Survey.

⁵ \$1,000,000 fund provided through Executive Order No. 6724 of May 28, 1934.

⁶ Set aside by Executive order or proclamation.

⁷ Upper Mississippi River Wildlife and Fish Refuge fund.

⁸ Miscellaneous fund.

⁹ Acquired by gift.

THE NATIONAL WILDLIFE REFUGE PROGRAM

The number of national wildlife refuges under the jurisdiction of the Biological Survey was increased by three, and much was accomplished in making the whole system more serviceable to wildlife. Under the improvement program, aided by C. C. C., W. P. A., and N. Y. A. labor agencies, a general increase was again noted in the number of birds and other wildlife using the refuges.

ADMINISTRATION AND MANAGEMENT OF REFUGES

The Biological Survey now administers 263 refuges (13,635,365 acres) (table 5), the 247 in the United States covering 9,541,163 acres and the 16 in Alaska, Hawaii, and Puerto Rico, 4,094,202 acres. It also administers 18 areas (12,417 acres) for experimental and administrative purposes, on which wildlife is protected.

The following 8 refuges (1,617,993 acres) were placed under active administration: Cabeza Prieta and Kofa, Ariz; Salton Sea, Calif.; Susquehanna, Md.; Brigantine, N. J.; and Lake Ilo, Lake Ardoch, and Long Lake, N. Dak. In addition, the 68 easement refuges in North Dakota (111,857 acres) were divided into districts and placed under the supervision of the personnel of 5 nearby refuges.

TABLE 5.—Classification and Acreage of National Wildlife Refuges Administered by the Bureau of Biological Survey

Classification	Number	Acres
For migratory waterfowl.....	176	3, 447, 218
For other migratory birds, small upland game, fur animals, and other wildlife.....	24	3, 475, 903
For colonial nongame birds.....	50	107, 666
For big game.....	13	6, 603, 578
Total.....	263	13, 635, 365

Custodianship was assigned to the Biological Survey of six wildlife-management areas, former Resettlement Administration projects, covering 276,404 acres, in the following States: Minnesota (Beltrami Island), Missouri, New York, North Carolina, South Carolina (Carolina Sandhills), and Wisconsin (Necedah). Actual administration is under a State agency, usually the department of conservation, but the Biological Survey will serve in an advisory capacity and review wildlife-management plans before adopted.

At the end of the year, exclusive of the easement refuges, 91 refuges (10,648,620 acres) were being operated by a staff of 223 permanent and 32 part-time (temporary) employees. The cost of maintaining the refuges has increased materially with the placing of additional refuges under active administration, but even more with the comple-

tion of the C. C. C. and W. P. A. development work on several refuges, which necessitates maintenance from regular appropriations.

Bird Refuges

New refuges.—Three important refuges were added during the year—the Susquehanna Migratory Waterfowl Closed Area, Harford County, Md.; the Noxubee National Wildlife Refuge, Winston, Noxubee, and Oktibbeha Counties, Miss.; and the Bosque del Apache National Wildlife Refuge, Socorro County, N. Mex.

The Susquehanna area (21,210 acres) was closed under the Migratory Bird Treaty Act by Presidential proclamations of August 24, 1939, and January 24, 1940, to protect all forms of wildlife, especially canvasback and other ducks, which there find an excellent resting and feeding ground.

The Noxubee Refuge (about 40,000 acres) was established by Executive order of June 14, 1940, to protect wild turkeys, waterfowl, muskrats, and other wildlife.

The Bosque del Apache Refuge (55,972 acres) was established by Executive order of November 22, 1939, because of its value as a resting and feeding area for waterfowl during migration. Many birds spend the winter on the area and some nest there.

Increased use by wildlife.—The waterfowl and other wildlife on the national wildlife refuges showed a substantial increase in numbers for the fourth consecutive year, as a result of improved water, food, and cover conditions and more adequate protection. In addition, some species not seen on the refuges since their establishment were observed.

In North Dakota at least 150,000 ducks were produced on the Lower Souris Refuge, and 50,000 on the Des Lacs Refuge, in both cases substantial increases over previous years. For the first time since the establishment of the Lower Souris Refuge at least two pairs of wild unpinioned Canada geese, thought to be offspring of captives, nested there on artificial islands. The number of beavers on this refuge increased to 459 from the initial stock of 50 in 1935.

On the Sand Lake Refuge, S. Dak., more than 40,000 nests of Franklin's gull were found, compared with 20,000 in 1939, 6,100 in 1938, and 6,000 in 1937—the first year this species nested there—and at least 2,000,000 ducks stopped during the fall migration, a great increase over the previous years. On a floating island in the display pond a pair of wild Canada geese nested, the second nesting record since the establishment of this refuge, one brood having been hatched in 1939.

On the Mud Lake Refuge, Minn., 500 ruddy ducks nested, compared with about 50 each previous year since 1937, when the refuge was established.

The waterfowl stopping on the Necedah Refuge, Wis., during the spring migration was more than double the number present the previous spring. A maximum of 125,000 ducks wintered on the Savannah Refuge, Ga. and S. C. On the Muleshoe Refuge, Tex., the number of wintering ducks increased 400 percent and of Canada geese 250 percent over the previous year. Ten shoveler eggs on the Seney Refuge, Mich., provided not only the first nesting record of this duck for the refuge but probably for the entire Upper Peninsula.

On the Deer Flat Refuge, Idaho, at the peak of the fall migration there were about 200,000 pintails and 800,000 mallards, an increase of 100 percent over the preceding year. Snowy plovers seen on the Sacramento Refuge, Calif., established a new record for the refuge and its vicinity. Three new nesting records—western grebe, Brewster's egret, and white-faced glossy ibis—were established at the Salton Sea Refuge, Calif.

At the Bowdoin Refuge, Mont., three black ducks treated for botulism late in the summer gave the first observation of this species on the area; their occurrence in the vicinity is rare. The small herd of antelopes on this refuge, which numbered only 7 in 1935, was increased in 1939 to 27, when 10 fawns were born; the number born in 1940 is not yet known, but an increase of about 15 is indicated.

More than 1,300 geese of 4 species (Canada, white-fronted, lesser snow, and blue) remained all winter on the Lacassine Refuge, La., for the first time since its establishment. No accurate estimate could be made of the numbers of blue and snow geese that wintered on the Sabine Refuge, La., but on several areas closely packed flocks extended 1 mile long and 300 yards wide. There were flocks of blue and snow geese ranging from 40 to 200, on the Wheeler Refuge, Ala., during the fall migration, an unusual occurrence, since these birds rarely go so far east of the Mississippi Flyway. Canada and lesser snow geese were much more abundant on the Malheur Refuge, Oreg., in the fall than in previous years. Whistling swans stopped for the first time on the Bombay Hook Refuge, Del.

An encouraging increase in the number of trumpeter swans on the Red Rock Lakes Refuge, Mont., and its vicinity was revealed by a count made late in the summer of 1939. This showed for the refuge proper, 59 cygnets, or young birds, and 50 adults; for nearby lakes, 20 adults; and for the Yellowstone National Park, 17 cygnets and 53 adults—a total of 199 (76 cygnets and 123 adults), compared with 148 in the summer of 1938, and 158 in the summer of 1937.

Big-game Preserves and Ranges

The numbers of big-game animals on the Bureau's fenced preserves are given in table 6.

TABLE 6.—Animals on Fenced Big-game Preserves Maintained by the Bureau of Biological Survey (Estimated)

ANIMALS AS OF JUNE 30, 1940

Preserve	Buffalo	Elk	Antelope	Bighorn sheep	Deer		Texas long-horn	Total
					White-tailed	Mule		
National Bison Range, Mont.	437	48	-----	17	36	100	-----	628
Fort Niobrara National Wildlife Refuge, Nebr.	148	37	-----	-----	8	5	24	222
Sullys Hill National Game Preserve, N. Dak.	13	14	-----	-----	16	-----	-----	43
Wichita Mountains Wildlife Refuge, Okla.	497	202	32	-----	799	-----	171	1,701
Total	1,095	301	32	7	859	105	195	2,594

YOUNG BORN IN CALENDAR YEAR 1939

National Bison Range, Mont.	95	18	-----	8	12	26	-----	159
Fort Niobrara National Wildlife Refuge, Nebr.	30	11	-----	-----	2	-----	4	47
Sullys Hill National Game Preserve, N. Dak.	7	8	-----	-----	2	-----	-----	17
Wichita Mountains Wildlife Refuge, Okla.	112	30	7	-----	50	-----	27	226
Total	244	67	7	8	66	26	31	449

¹ All but this number were transferred to the Hart Mountain Antelope Refuge, Oreg.

Kofa and Cabeza Prieta Game Ranges, Ariz.—The desert grasses and shrubs on these ranges were in the best condition they have been for many years, following plentiful fall and winter precipitation. Water was available for all wildlife using the Kofa Range, but the supply on the Cabeza Prieta Range was not adequate. Numerous bighorn sheep were seen regularly on these ranges, but no accurate estimate of their numbers could be made. Gambel's quails were abundant, and coveys could be seen at the watering places at almost any time.

National Bison Range, Mont.—Of the 54 bighorn sheep on this range at the beginning of the year, 25 were transferred to the Hart Mountain Refuge, Oreg., which is believed to provide the species a more suitable habitat.

Desert Game Range, Nev.—About 350 bighorn sheep and 175 deer were estimated to be on this area at the end of the year. Conditions for the big game were excellent. Since the range was established 47 species of mammals and 66 of birds have been recorded.

Sheldon National Antelope Refuge, Nev.—Considerable rainfall during the spring months resulted in a good growth of browse for the

antelope and other animals, and at the close of the year there were on the refuge about 1,200 antelopes, including about 400 fawns, approximately 300 mule deer, 250 wild horses, and large numbers of sage hens.

Wichita Mountains Wildlife Refuge, Okla.—Spring rains on this refuge put the range in much better condition than in most years and brought up water levels in the lakes, which had been greatly lowered during the acute drought in the preceding summer and fall, when it was necessary to release water from Rush, Jed Johnson, and Elmer Thomas Lakes to supply Fort Sill and the city of Lawton. In January, 24 antelopes were received from New Mexico in exchange for the same number of elk. They appear to have acclimated themselves satisfactorily. With additional range made available by the curtailment of grazing by domestic stock, the longhorn cattle herd was permitted to increase slightly and numbered 171 at the end of the year, compared with 149 in 1939.

National Elk Refuge, Wyo.—Although no official enumeration of the elk in the Jackson Hole herd has been made since the spring of 1938, when 17,370 were counted, of which 7,782 were on the refuge, it was estimated that at least 9,000 spent the past winter on the area. Weather conditions were such that it was not necessary to feed them hay, and few losses occurred.

DEVELOPMENT OF REFUGES

Engineering Work

During the fiscal year, projects involving engineering work and inspection were undertaken on 72 refuges, the actual construction being done by C. C. C. and W. P. A. labor. Preliminary surveys were made on 29 refuges, and construction plans were drawn up for 32. In addition, technical information of use in the administration of the Federal Aid to Wildlife Restoration Act was developed and the engineering feasibility of a number of proposed refuges was investigated.

As in previous years, one hydraulic engineer attended to the filing of water rights and the protection of water supplies and negotiated with various Federal and State agencies on matters involving the use of water on or affecting the wildlife refuges. He was one of three engineers who represented the United States on the Souris River water adjudication and conferred with Canadian representatives on the distribution of the water of this international stream, on which three of the Biological Survey refuges in North Dakota are situated.

Biological Development

Food and cover.—In the marsh and aquatic planting program, 200,000 pounds of seeds, tubers, and rootstocks were collected within the refuge system, to meet the needs for biological rehabilitation of newly acquired areas and to hasten natural recovery on lands mismanaged by former owners. Improved seed-collecting technique and abundant crops combined in some instances to provide supplies somewhat in excess of immediate needs and permitted the distribution of material to other public agencies for use in wildlife-habitat improvement.

In the development of upland-game habitat, 1,250,000 trees, shrubs, and vines were used, part of which were made available through the cooperation of the Soil Conservation Service, Tennessee Valley Authority, Forest Service, and State conservation departments. About 3,000 pounds of tree and shrub seeds were collected for the propagation of wildlife food and cover plants needed for future development work, some of which were turned over to other agencies for propagation under growing agreements. For improvement of big-game ranges where intense utilization had reduced the forage supply, 12,000 pounds of seed, collected mostly within the refuge system, were used. To establish supplementary feed patches, 14,000 pounds of seeds of legumes and other food plants were sown on quail and turkey management sites.

About 30,000 acres of land were cultivated by sharecroppers, under agreements, and by refuge personnel to provide supplementary food for wildlife during critical periods and to aid in sustaining increasing wildlife populations. A large percentage of this acreage was sown to forage crops for geese. On a 5-acre field of millet and buckwheat planted on the Tamarac Refuge, Minn., 33 pheasants, 6 prairie chickens, 12 ducks, 1 Canada goose, and 11 white-tailed deer were seen feeding at one time.

Controlled burning.—The recognized importance of controlled burning in marsh management for waterfowl has led to an increased use of fire on coastal areas where field investigations indicate that this practice will be of greatest value. The importance of controlled burning in certain types of marsh vegetation is indicated by the fact that more than 100,000 blue and lesser snow geese fed extensively on burned areas on the Sabine Refuge, La., which they had previously avoided. Extensive field observations were carried on to obtain additional data on the several interrelated factors involved. Controlled burning was also practiced on several hundred acres of land lying within upland-game management demonstration units.

Control of noxious aquatics.—Factors favoring the development of an optimum waterfowl habitat also permit the growth of noxious plants that tend to supplant those of high value to wildlife and thereby minimize the utility of the area. Where the problem exists, control measures have been undertaken with noteworthy success, particularly in the reduction of cattails. Special equipment is being developed for future work of this nature.

Cover management.—The rapid response to habitat-improvement work on refuges is reflected in increasing wildlife populations, which in several instances have permitted the removal of mature breeding stock for restocking public lands. From the Sand Lake Refuge, S. Dak., 1,830 pheasants were distributed to 6 counties for restocking under the direction of conservation officials of that State. Surplus deer and raccoons also were released to various State conservation departments for restocking depleted coverts.

Nesting.—The design of boxes for tree-nesting ducks was improved on the basis of field investigations of their use. Artificial nesting boxes have produced a material increase in breeding wood ducks and goldeneyes, and 750 new ones were constructed and installed, and many old ones reconditioned. To provide essential habitat features for waterfowl and shorebirds in new impoundments, 49 additional nesting islands were constructed.

Winter feeding.—During severe winter weather, when it becomes necessary to provide grain for birds unable to find food because of ice and snow, not only is feeding done on the refuges but elsewhere in cooperation with local agencies. Some of the grain used is raised on the refuges, some is purchased, and some is donated by other agencies—Federal, State, or private. Through the cooperation of the Bureau of Agricultural Economics, 10,896 bushels of mixed grains were obtained from 12 grain-inspection stations.

The severe winter of 1939-40 made it necessary to do more feeding than usual. On and adjacent to the Brigantine Refuge, N. J., about 2 tons of grain were distributed daily to some 600 black ducks and other birds, much of it, quickly and effectively, by means of an airplane. Considerable feeding also was done on the White River Refuge, Ark.

Civilian Conservation Corps Development on Refuges

Work accomplishments.—The C. C. C. continued to have an important part in the long-range program of developing waterfowl and other game refuges. There were C. C. C. camps on 41 National and 1 State wildlife refuge in 26 States. The number of full-strength camps averaged approximately 35, and 1 side camp was used. Among

8 new camps, the one at the Ogden Bay State Refuge, Utah, is especially noteworthy because it is the first C. C. C. activity by the aid of which a State will directly participate under the provisions of the Federal Aid to Wildlife Restoration Act. Work programs were completed by 5 camps, making 20 in all that have finished the development work assigned to them by the Survey. Enrollees detailed by other services worked on 8 other refuges, making a total of 16 refuges improved by C. C. C. enrollees working from side camps or on special details.

The development work differed in each locality because of wide variances in soil and water conditions and their influences upon food and cover vegetation but was of the same nature as outlined in previous reports. The following few accomplishments indicate its scope: More than 240 miles of truck and patrol trails, 26 bridges, 70 miles of telephone lines, 80,908 rods of fences, 11 lookout towers, 18 dwellings, 6 overnight cabins, and more than 50 barns, garages, and other service buildings were constructed to enable the personnel to administer the refuges and maintain the sanctuary status effectively and economically. To provide favorable water conditions for wildlife, the enrollees built 8 large diversion dams; moved more than 1,700,000 cubic yards of earth in constructing dikes and levees; excavated more than 660,000 cubic yards of earth and rock to provide 21,570 lineal feet of ditches and canals; built 14 small reservoirs and 96 permanent check dams; cleared and cleaned debris and undesirable growths from approximately 560,000 square yards of water channels and 1,180 acres of lake and pond sites; and built 83 spillways and other water-control structures. They planted desirable food and cover vegetation on 4,696 acres.

Job-training and educational programs.—In the development work on the refuges thousands of enrollees are given practical training and instruction both in classroom and field, the training being practical rather than theoretical, because classroom work is supplemental to field training, which in turn is supplemental to actual field work, where more than 1,100 trucks, tractors, trail builders, graders, draglines, and other pieces of equipment were used by enrollees under skilled supervision. Of the 610,000 enrollee training hours, about 300,000 were given to instruction in truck, tractor, and dragline operation and repair; welding; surveying; the handling of dynamite; and the construction of roads, bridges, and buildings.

Safety program.—The safety program is closely correlated with the training program and is so emphasized that the accident-frequency record for 1940 was better than ever. The 1.35 accidents per 10,000 man-days of work in 1939 dropped to 1.13; that is, there were 1,054,920

man-days of labor with only 119 lost-time accidents, a decrease of 24 accidents from last year. At the close of the year, 8 camps had operated without a lost-time accident for 12 months or more, 1 of these, the Tule Lake camp, California, for 29 consecutive months. Three fatalities marred an otherwise satisfactory record.

Cooperation With the Work Projects Administration

The development of refuges by the W. P. A. was continued on 45 areas in 16 States, for which Federal W. P. A. allotments of \$831,298 were made available to the Biological Survey and provided approximately 13,675 man-months of employment. In addition, 23 Bureau-sponsored State projects were approved, for which Federal W. P. A. funds of \$865,676 were supplemented by \$298,490 from the Bureau for the purchase of materials and supplies and for furnishing equipment and supervision.

The emergency relief funds received from the W. P. A. not only enabled the Biological Survey to continue important development phases of its national wildlife-restoration program but also provided useful work for persons in need of relief. The great variety of work done included the construction of dams, dikes, and ditches for impounding water and creating marshes and the installation of structures for controlling water levels for the production of wildlife food and cover. Aquatic and upland vegetation, shrubs, and trees were planted to provide supplementary food and cover, reduce soil erosion, and assist in the prevention of floods. Nesting islands and upland-game shelters of various types were built, fences erected, refuge boundaries posted and marked, and roads and fire lines constructed or rebuilt. In several cases administration buildings were constructed and landscaped.

Federal W. P. A. funds totaling \$119,030, supplemented by Bureau contributions of \$32,136, provided 1,488 man-months of employment of statistical and clerical help to assist in bringing old work to date.

Inspection of proposed drainage projects.—In furtherance of a co-operative understanding, 202 applications submitted to the W. P. A. for drainage projects (most of which were State- or county-wide in character) were referred to the Bureau for review as to their probable effect on wildlife. Of these projects, 89 (538 units) were concerned with agricultural drainage for flood control and land utilization, and 113 (415 units) involved pest and malaria-mosquito control.

Of the 953 work units involved, 38 that threatened to be unnecessarily detrimental to wildlife were disapproved as recommended by the Bureau, 203 were recommended for partial or conditional ap-

proval, with the proviso that the plans be so modified as not to menace wildlife; and the remaining 712, which did not involve wildlife values, were recommended for unconditional approval. In the projects concerned with land-utilization drainage, practices were recommended and carried out that assured stabilized water levels and the least possible damage to wildlife; and in the mosquito-control drainage projects, wherever practicable, methods of mosquito reduction through impoundment and water control rather than mechanical drainage were recommended and effected. In this manner, appreciable acreages of wildlife habitat were saved from destruction.

National Youth Administration Assistance

The Biological Survey was fortunate in again having N. Y. A. labor available for research projects and other refuge work not suitable for C. C. C. and W. P. A. labor. It was utilized on most of the 68 North Dakota easement refuges; on the Moosehorn Refuge, Maine; Seney Refuge, Mich.; Tamarac Refuge, Minn.; Arrowwood and Des Lacs Refuges, N. Dak.; and Sand Lake and Waubay Refuges, S. Dak. The projects thus accomplished included constructing small boats, trailers, picnic tables and benches, office equipment, and snow fences; repairing and improving roads and fences; planting and cultivating lawns and tree and shrub plots; collecting and planting aquatic seeds; brush burning; patrolling; constructing banding traps, shelters, and nesting boxes; and making nesting studies and wildlife enumerations.

PUBLIC USE OF REFUGES

Economic Uses

In disposing of surplus products on some of the national wildlife refuges, there were issued 167 permits for cutting approximately 10,276 tons of various kinds of hay and 183 grazing permits covering approximately 107,093 animal months' use by 17,755 cattle, 12,659 sheep, 288 horses, and 75 hogs. Care was taken to safeguard the interests of wildlife. Before impounding water in timbered areas on some of the refuges it is first necessary to cut trees and brush from areas to be flooded. To 294 permittees, living mostly in the immediate vicinity of the refuges, who needed the wood for fuel, 6,500 cords of such surplus timber were given. To provide supplementary food for wildlife, 319 farmers cooperated with the Bureau in planting 27,829 acres of refuge land to grain crops on a share-crop basis.

Permission was granted to 286 permittees for such miscellaneous uses of refuge lands as harvesting hay; keeping bees; picking fruit; operating and maintaining stock driveways across refuge lands for

watering cattle; erecting, maintaining, and using buildings; and constructing power and telephone lines, roads, and ditches.

In the course of the regular effort to prevent increase of the herds to a point where they will overgraze the range, 184 buffaloes and 54 elk, 4 mule deer, 1 white-tailed deer, and 8 longhorn cattle were removed. These were either sold or donated for butchering or for exhibition and propagation.

The total revenue received for the use of refuge lands and from the sale of surplus big-game animals and other refuge products was \$75,845.28. In accordance with the law, 25 percent of this was turned over to the counties in which the refuges are situated and the remainder deposited in the Federal Treasury.

Recreational Facilities

In addition to the many people taking advantage of opportunities afforded on the wildlife refuges for recreation, such as picnicking, swimming, boating, fishing, and hunting (on 7 refuges only), thousands annually visit the areas to learn more about the conservation work being done. As many as 400 persons visited the Waubay Refuge, S. Dak., on Sundays during the summer, and more than 6,000 picnicked on or otherwise used the recreational area on the Moosehorn Refuge, Maine, during July. Each winter thousands of people visit the National Elk Refuge, Wyo., to see the elk concentrated on their feeding grounds.

Fishing is permitted on specified parts of many of the refuges when it is determined that it will not interfere with the wildlife. Eight orders designating fishing areas were issued during the year. More than 500 persons fished on the Squaw Creek Refuge, Mo., on the opening day of the season, and during 4 months 9,034 fishermen on the Chautauqua Refuge, Ill., took 116,471 fishes.

ADMINISTRATION OF WILDLIFE CONSERVATION LAWS

The principal Federal statutes administered by the Biological Survey for the conservation and restoration of wildlife are (1) the Lacey Act of 1900, as amended, regulating shipments in interstate and foreign commerce of wild animals, their dead bodies, or parts thereof, and the importation of live birds and mammals from foreign countries; (2) the Migratory Bird Treaty Act of 1918, protecting birds that migrate between the United States and Canada, as amended to extend its provisions to the treaty of 1937 protecting birds that migrate between the United States and Mexico, and regulating the movement of game mammals and parts thereof between the two countries; (3) the Migratory Bird Conservation Act of 1929, authorizing the establishment of

bird refuges; (4) the Migratory Bird Hunting Stamp Act of 1934, as amended, to aid in refuge establishment; (5) the Federal Aid to Wildlife Restoration Act of 1937; (6) a law (sec. 84, Criminal Code) protecting wildlife and Government property on Federal refuges; (7) through the Alaska Game Commission, the Alaska Game Law of 1925, as amended; and (8) the Bald Eagle Act, approved June 8, 1940, extending Federal protection to the bald eagle in the United States or any place subject to its jurisdiction, except in Alaska.

REGULATORY ACTION

The Migratory Bird Treaty Act regulations were amended in a very few particulars, the length of open seasons on waterfowl, coot, and Wilson's snipe being retained at 45 days, but opening in the intermediate zone on October 22 instead of October 15 as in 1938, and the possession limit on woodcock being changed from 4 birds to not more than 2 days' bag limit. Publications relating to conservation laws included a processed abstract of State fur laws affecting trapping seasons, possession, and the sale and shipment of pelts (Leaflet BS-147) and Wildlife Circular 2, the annual directory of game-protection officials. Amendments to the regulations under the Alaska game law were published in Alaska Game Commission Circular AGC-18. Conferences with representatives of State game departments on conditions affecting the conservation and hunting of migratory game birds were a great aid in drafting the hunting regulations for the 1940 season.²

WORK OF GAME-MANAGEMENT AGENTS

The 46 game-management agents and 19 deputy agents, singly or in cooperation with State officers and deputy game wardens, obtained evidence in 2,939 cases of game-law violations. Prosecuted in State and Federal courts, these resulted in 2,773 convictions as given in table 8 (p. 279).

Because of the hazardous nature of the duties of the game-management agents the Civil Service Commission on June 17, 1940, assigned them to the 62-year-age retirement group. To further game protection, the agents conducted film and radio programs, addressed schools, civic organizations, and sportsmen's clubs, issued statements through the press, and assisted locally on other lines of Bureau investigations. Results of their enforcement activities are exemplified in the following migratory game bird cases:

² Regulations for 1940, adopted by the Secretary of the Interior on August 2, were approved and proclaimed by the President on August 9 (5 F. R. 2813)

In Tennessee, a defendant was fined \$500 and \$50 costs for shooting mourning doves in a baited field.

In Louisiana, one alleged duck bootlegger was given a 75-day and another a 65-day jail sentence.

In Arkansas, for hunting ducks in close season, two defendants were each sentenced to 30 days in jail and fined \$150.

In North Carolina, a defendant was given a 4-month jail sentence for selling wild geese; another, charged with killing wild geese during close season, was given 60 days.

In Michigan, killing and possessing whistling swans brought a sentence of 30 days in jail and a fine of \$400.

In Nevada, two violators were each fined \$250 for killing ducks from a motorboat.

In Ohio, conviction on a charge of trapping ducks brought a fine of \$300 and \$23 costs, and a 3-month suspended jail sentence.

In Virginia, for selling wild ducks, a duck bootlegger was fined \$500.

Under-cover Operations

Out of current appropriations for the protection of migratory birds, the Secretary is authorized to expend at his discretion not to exceed \$10,000 for obtaining information concerning violations of Federal game laws. The expenditure of \$3,850.54 of this authorization in under-cover operations produced evidence obtained by game-management agents against many unlawful commercial dealers in game who otherwise might not have been apprehended. In addition to successfully conducted under-cover investigations in Louisiana, Maryland, Minnesota, Texas, Virginia, and Wisconsin, the results in the following States were outstanding:

In Tennessee, Arkansas, and Mississippi, 110 sellers or buyers of migratory waterfowl and other game birds were given an aggregate sentence of \$4,573 in fines and 216 days in jail.

In the San Francisco-Sacramento area, California, excellent cooperation by United States attorneys and Federal judges resulted in the conviction of 48 dealers in wild fowl, 3 of whom were fined \$500 each, 3, \$250 each, and the rest were given smaller fines and jail sentences ranging from 30 days to 9 months, the fines aggregating \$3,315 and the jail sentences 57 months.

Of 9 persons apprehended for dealing in migratory wild fowl in southern California, 4 were placed on probation for 1 year each.

In Iowa, duck bootlegging cost one violator a fine of \$250 and \$37.50 costs, and another \$125 and \$36.25 costs.

Apprehensions Under Various Statutes

Migratory Bird Treaty Act cases.—Of 829 new cases filed in Federal courts and 273 pending from the preceding year, 833 were disposed of with 666 convictions (table 7)—a decrease from the preceding year of 32 new cases and of 19 cases terminated but an increase of 18 convictions. Fines, ranging from 1 cent to \$500 and costs, aggregated \$19,656.64, fines totaling \$1,060 having been suspended in 22 cases. Jail sentences aggregated 3,321 days in 42 cases; suspended sentences, 891 days in 9 cases; and probation terms, 2,281 months in 84 cases.

TABLE 7.—Cases of Violation of the Migratory Bird Treaty Act Disposed of During the Year and Cases Still Pending on June 30, 1940

Disposed of	Num- ber	Pending	Num- ber
Convictions.....	666	From preceding year.....	273
Dismissals.....	48	New cases.....	829
Nol-prossed.....	42		
Jury trial, not guilty.....	18	Total.....	1, 102
Closed without prosecution.....	18	Disposed of.....	833
No bill.....	38		
Closed by death.....	2	Pending at end of year.....	269
Dropped with leave to reinstate.....	1		
Total.....	833		

Migratory Bird Conservation Act cases.—Of 27 new cases and 16 pending from the preceding year, 38 were closed as follows: Thirty-four brought convictions, 3 were nol-prossed, and 1 was adjudged not guilty. The 34 sentences imposed aggregated \$1,160 in fines, 475 days in jail, and 6 months' jail sentence suspended, and 7 years and 1 day probation.

Migratory Bird Hunting Stamp Act cases.—Of 63 new cases and 30 pending from the preceding year, 70 were disposed of as follows: Four were closed without prosecution, 4 were dismissed, 1 was nol-prossed, 3 were found not guilty; fines aggregating \$481 and \$37.10 costs were assessed in 37, and 1 fine of \$25 was suspended; defendants in 2 cases were each sentenced to 15 days in jail and in 6 were each given 1 year's probation; and in 12 cases the accused were found guilty but were assessed penalties by the court upon counts charging violations of the Migratory Bird Treaty Act regulations.

Wildlife Refuge Trespass Act cases.—Of 8 new cases and 5 cases pending from the preceding year, 11 were closed, 1 being nol-prossed and 10 receiving convictions, an aggregate of 110 jail days being imposed in 7 cases; fines of \$105 in 2; and a year's probation in 1.

Upper Mississippi River Refuge cases.—Of 27 new cases and 20 pending from the preceding year, 24 were terminated, as follows: Convictions were obtained in 22, the fines aggregating \$125, suspended jail sentences 4 years and 10 months, and probations 26 years; 1 was nol-prossed; and 1 was closed without prosecution.

Lacey Act cases.—The 10 new cases and 2 cases pending from the preceding year were terminated, by convictions in 10, with fines aggregating \$220, by dismissal in 1, and by failure of the grand jury to return a true bill in 1. Agents making inspections under this statute in fur-receiving centers discovered information relating to possible infractions of State game or fur laws. Invoices relating to 1,658 shipments of pelts were sent to game-protection officials in the various States, Alaska, and Canada and disclosed 241 law violations that were terminated in State courts by fines and costs aggregating \$5,633.83.

Other cooperation with States.—Evidence regarding 1,752 cases involving violations other than illegal shipments of skins of fur animals were handled in 42 States, where fines and costs aggregated \$57,515.87 and jail sentences (91), 5,369 days. Investigations by State wardens and game-management agents working together broke up many commercial groups operating unlawfully in fur and game. In some instances State and Federal officers operated patrol boats jointly.

TABLE 8.—Summary of Penalties Imposed for Game-Law Violations, Fiscal Year 1940

Act or law	Convictions (number)	Fines and costs	Jail sentences (days)
Migratory Bird Treaty Act.....	666	\$19,656.64	3,321
Migratory Bird Conservation Act.....	34	1,160.00	475
Migratory Bird Hunting Stamp Act.....	38	518.10	-----
Wildlife Refuge Trespass Act.....	10	105.00	110
Upper Mississippi River Wildlife and Fish Refuge Act.....	22	125.00	-----
Lacey Act.....	10	220.00	-----
State prosecutions resulting from Lacey Act investigations.....	241	5,633.83	-----
State laws, cooperative prosecutions.....	1,752	57,515.87	5,369
Total.....	2,773	84,934.44	9,275

IMPORTATION AND OTHER PERMITS ISSUED

REGULATIONS

Treasury regulations were amended at the request of the Department of the Interior to require a permit for the importation of any number of canaries. The former privilege of allowing five to be entered without permit was often abused, other species being entered under the guise of canaries when the customs inspectors were unable to identify the birds. The regulations were further amended to limit to three the number of parrots or birds of the parrot family that may be entered without permit, in order to conform this regulation in this respect to the regulations of the Public Health Service.

SPECIES EXCLUDED

A few attempts to import prohibited species, including crested mynas (*Aethiopsar cristatellus*) and skylarks (*Alauda arvensis*), were detected by inspectors and frustrated. Applications for permits to import as cage birds several species of migratory birds from Mexico, Cuba, and Central America continued to be received but were refused. Quite frequently, ignorantly or deliberately, attempts are made to import migratory birds, especially of the sparrow and bunting types, as canaries. One mongoose, brought by a passenger from Africa, arrived at the port of New York on February 19. Denied entry by Customs officers, it remained aboard the steamer until chloroformed on March 2.

SPECIES ENTERED UNDER PERMIT

The number of importation permits issued was 1,492, including 18 at Honolulu, Hawaii; and 272 importations were inspected.

Birds

Foreign birds imported into continental United States, a total of 252,153, compared with 252,628 last year, included 135,287 canaries, 125 parrots, 85,995 Mexican quails, 3,081 Hungarian partridges, 897 pheasants, and 26,768 miscellaneous birds. At Honolulu, 255 foreign birds were entered, compared with 492 last year.

After the outbreak of the European war in September, large shipments of canaries for the United States were routed via Holland and Belgium instead of direct from Germany. From then on only one shipment of Hungarian partridges (2,400) was imported from Europe, compared with several large shipments the previous year. About 681 Hungarian partridges raised by breeders were brought in from Canada.

The first shipment of bobwhites from Mexico (2,800) arrived as early as December 2, the next, however, not until January 13. Thereafter and until the end of the season on April 15, the birds came in steadily in large consignments. The total number imported was 85,995, compared with 87,457 last year, of which 2,250 were entered at Brownsville, 5,800 at Eagle Pass, and 77,945 at Laredo, Tex. Imported for stocking purposes, most of these birds were distributed in Texas, Indiana, Kentucky, and Mississippi, but small lots were sent to 18 other States and the District of Columbia.

Among the more interesting pheasants imported were 8 Siamese fire-back pheasants (*Diardigallus diardi*), from Singapore; 12 copper pheasants (*Syrmaticus soemmerringii*), from Japan; 1 argus pheasant (*Argusianus argus*), from the East Indies; and 1 Swinhoe pheasant (*Hierophasis swinhoii*) and 1 Elliot pheasant (*Calophasis ellioti*), in a shipment from Canada.

In addition to the requirement of an importation permit from this Department and in some cases State permits, the entry of birds of the parrot family continues to be subject to the regulations of the Public Health Service. Among the more interesting parrots imported were 4 Kuhl lorries (*Vini kuhlii*) and 2 Society Island lorries (*Vini peruviana*), from Papeete, Tahiti.

Other interesting importations were 2 Falkland robins (*Turdus falklandicus*), 2 Chilean lapwings (*Belonopterus chilensis chilensis*), 2 Chilean sparrow hawks (*Cerchneis sparveria cinnamomina*), 6 chingolos (*Brachyspiza capensis*), and 4 guans (*Ortalis* sp.), from Chile; 7 chungas (*Chunga burmeisteri*), from Argentina; 2 Pacific pigeons (*Globicera pacifica*), from the Fiji Islands; 1 European jay (*Garrulus glandarius*), in a shipment from Japan; 6 crocodile plovers (*Pluvianus aegyptius aegyptius*), from England; 7 lesser double-collared sunbirds (*Cinnyris chalybea*), 1 Malachite sunbird (*Nectar-*

inia famosa), 1 Livingstone's touraco (*Turacus livingstonii*), 2 Hadada ibises (*Hagedashia hagedash*), 1 crowned hawk eagle (*Stephanoaetus coronatus*), 1 northern lizard buzzard (*Kaupifalco monogrammicus*), and 1 yellow-casqued hornbill (*Ceratogymna elata*), from Africa.

Mammals

Importations of black bear cubs from Canada, mostly destined for roadside menageries, were fewer than usual. The total number was 92, compared with 137 last year. Rhesus monkeys, imported chiefly as experimental subjects for human diseases, totaled 10,146, compared with 12,536 last year. Among other interesting mammals were 2 giant pandas (*Ailuropoda melanoleuca*), from China, 1 in September for the St. Louis Zoo and 1 in November for Chicago's Brookfield Zoo. Other rare and interesting animals included 1 potto (*Perodicticus potto*) and 2 Gambian pouched rats (*Cricetomys gambianus*), from Liberia; 1 crab-eating seal (*Lobodon carcinophaga*), from Palmer Land, Antarctic Archipelago; 1 murine opossum (*Marmosa elegans*) and 1 Azara's fox (*Pseudalopex gymnocereus*), from Chile; 1 manatee (*Trichechus inunguis*), from Brazil; 3 Tasmanian devils (*Sarcophilus harrisii*), from Australia; and 2 Arctic foxes (*Alopex lagopus*), in a shipment from Belgium.

PERMITS UNDER THE MIGRATORY BIRD TREATY ACT

For Scientific Purposes

To take migratory birds or their eggs for scientific purposes, 447 permits (general or under specific limitation) were issued and 1,753 were outstanding at the close of the year. Permits of similar limitation to possess migratory birds or their eggs, lawfully acquired for scientific purposes, were issued to 56 persons, and 564 were outstanding at the close of the year. Others issued were 167 for possession of one or a few specimens found dead; 155 for banding migratory birds; and 43 for taking birds and mammals in Alaska.

For Propagation

Permits to take migratory waterfowl for propagation were issued to 30 persons, each permit limiting the species and the number of individuals of each and the time to be taken. To possess migratory waterfowl lawfully acquired for propagating purposes, 319 permits were issued. At the close of the year 3,788 propagating permits were outstanding. Failure of permittees to render the required annual reports or to surrender their permits upon discontinuing operations resulted in 331 permits being recalled, canceled, or revoked.

Reports submitted by permittees disclose that 3,820 wild geese and 74,708 wild ducks were raised in captivity. Of these, 71,674 were mallards, 958 black ducks, 925 wood ducks, and the remainder principally teals, pintails, ringnecks, wigeons, and redheads. Sales of propagated migratory waterfowl included 15,075 ducks and 350 geese for food and 17,411 ducks and 1,224 geese for propagation. From propagating stock, 8 swans, 192 mourning doves, and 11 band-tailed pigeons were produced. Of propagated birds, 15,667 ducks, 360 geese, and 66 mourning doves were liberated.

For Depredation Control

To enable permittees to protect crops, fishes, and other property from serious depredations by migratory birds, 506 permits were issued. Many complaints of depredations were investigated and suggestions and aid given for relief without the necessity of killing the birds.

COOPERATIVE CONTROL OF INJURIOUS ANIMALS

Cooperative work in predator and rodent control entailed an expenditure of \$687,203 from departmental funds, \$475,644 from cooperating States, \$1,085,540 from cooperating counties, livestock associations, and others, and about \$536,698 from emergency funds. In these operations 116,805 predatory animals were taken, consisting of 104,072 coyotes, 1,355 wolves, 10,556 bobcats and lynxes, 608 predatory bears, and 214 mountain lions. Through W. P. A. cooperation in Montana, Utah, Oregon, and Idaho, W. P. A. hunters working under direct Bureau supervision ably supplemented the regular predator-control work. To reduce infestations of prairie dogs, ground squirrels, pocket gophers, jack rabbits, field mice, and other injurious rodents, treatment of 12,174,125 acres was supervised. In addition, without direct supervision but under general instructions of the Bureau fieldmen, approximately 20,659,759 acres were treated for the control of field rodents and, in cooperative campaigns for the eradication of the common rat, 198,902 premises were treated. The Bureau's supply depot at Pocatello, Idaho, prepared and distributed to cooperators in all parts of the country 1,822,085 pounds of rodent bait materials, as well as equipment for use in predator and rodent control.

PREDATORY-ANIMAL CONTROL

In harmony with established policy, predatory-animal control projects for the protection of livestock, poultry, and game were conducted only in areas where there was pressing need. The coyote is the chief subject to control, as it is responsible for a greater total loss to live-

stock and poultry than all other predators combined, and has markedly increased in the last 10 years in most sections of the West and is becoming established locally in the East. In the southwestern mountains and forests it is apparently increasingly skillful as a killer of both game and livestock. In many States where the game departments are seeking to develop suitable game areas predators interfere seriously with the increase and, in some instances, the survival of desirable species.

To curtail the spread of rabies and other canine-borne diseases required coyote control in some areas. A serious outbreak of rabies among coyotes in Pima and Santa Cruz Counties, Ariz., during July 1939 spread to domestic dogs and as a result several people were bitten and 16 were given the Pasteur treatment. Predator control was inaugurated after a fall and winter outbreak of anthrax in livestock in Beaverhead County, Mont., where coyotes were found to be feeding on the diseased carcasses and carrying parts of them to other localities, thus spreading the disease.

Cases of Predation

Following are a few representative instances of the many cases of losses occasioned by predatory animals during the year:

Coyotes.—One operator in Skull Valley, Ariz., lost 250 goats during 2 fall months. On a ranch in Hudspeth County, Tex., 1 male coyote taken by a Bureau hunter had killed 100 Angora goats within a short period. During January, February, and March, 31 buck deer were killed by coyotes on a ranch in southern Texas. A rancher near Buffalo, Wyo., lost 75 turkeys to coyotes in 1 night. Close observation demonstrated that coyotes destroyed 40 sage grouse near a water reservoir in Johnson County, Wyo., an area particularly adaptable to grouse and on which the State Fish and Game Commission is attempting to establish them. One sheepman in western Salt Lake County, Utah, lost 250 lambs to coyotes in less than a month, and one in Grant County, N. Dak., lost 125 from his flock of 500 sheep during the year. That coyotes occasionally injure crops also is shown by recent requests for assistance from southern California where the animals were inflicting severe damage to watermelons and avocados.

Wolves.—Within 3 months 1 red wolf destroyed 200 lambs on a ranch in McCulloch County, Tex. Bureau observers in Alaska report wolves more abundant than for the past 20 years and their depredations especially heavy on mountain sheep, caribou, and moose in the Mount Hayes section. Wolf predation in three parishes of north-central Louisiana became so severe by 1939 that the local cattle-and-hog industry was practically forced out of existence.

Other predators.—Bobcats are defeating the introduction and propagation program for wild turkeys and deer on the Pearl River County and Leroy Percy State Game Refuges in Mississippi, according to reports from the Mississippi State Game and Fish Commission. On a ranch near Ellensburg, Wash., a mountain lion stampeded a flock of sheep in a brushy canyon, killing 3 outright and causing the death of 52 others in the stampede pile-up. On a ranch in Hudspeth County, Tex., a female mountain lion killed 50 sheep within a few weeks.

Peg-legged predators.—Studies of food habits reveal that peg-legged, or trap-crippled, predators are more devastating to livestock than are normal individuals. Apparently this is because they are less capable of catching wild fleet-footed quarry and therefore prey more heavily upon young livestock. One male coyote that had lost two toes in a trap killed 26 yearling lambs valued at \$8 each in Fisher County, Tex., within a period of 30 days. Poor trapping technique aggravates the problem of control, and the employment of expert trappers is in line with efficient, economical, and humane procedure.

Benefits of Predator Control

A sheep operator in the vicinity of Rock Springs, Wyo., reported that as a result of the Bureau's predator-control activities his livestock losses were reduced from 10 to 3 percent. At the request of the Arizona Woolgrowers' Association a hunter was assigned to each of the sheep driveways during July to trap out concentrations of coyotes before the annual trek to winter pasture began. As a result, no serious losses were reported along the trail, whereas losses previously ran as high as 15 percent.

Coyote-control operations in Presidio County, Tex., resulted in a 40-percent increase in the antelope herd on one range. In a suburban area near Portland, Oreg., where coyotes were causing serious losses to small flocks of sheep and poultry, after 5 coyotes were taken there were no more losses. A hunter took 8 old killer coyotes in Stutsman County, N. Dak., and thus ended further depredations where small stockmen were being forced out of business.

Depredations on cattle and sheep in Winn Parish, La., were curtailed when a Bureau hunter took a 92-pound wolf and 3 smaller ones. After a 4-year pursuit a Bureau hunter, in Laclede County, Mo., took a destructive wolf to which one stockman alone had lost \$800 worth of sheep, and whose depredations had been so severe generally that the county government and local stockmen had offered a bounty of \$140 for its capture.

RODENT CONTROL

Damage in the West by ground squirrels, prairie dogs, kangaroo rats, pocket gophers, and other field rodents continued to be severe on crops, range vegetation, and silvicultural plantings. Tree-girdling mice inflicted great damage to orchard trees and nursery stock in some sections, though this was curtailed markedly in eastern areas where control has been practiced during the past few years. Widespread and in many instances severe depredations by the common rat varied greatly, from the contamination and destruction of stored food supplies and crops to gnawing of insulation from electric wires and cables. The kangaroo rat has been a major factor in depleting range forage on many western grazing areas, and through its seed-gathering habits this rodent tends to reduce the natural reseeding of range lands. One observer in charge of a reseeding project in New Mexico stated that his men could gather more valuable grass seeds from kangaroo rat dens in a day than they could in a week from the mature grass on the range.

The extent of rodent damage has led States, counties, municipalities, farm organizations, and others to increase their financial support to cooperative programs. Rodent control was also conducted through the medium of C. C. C. camps in cooperation with various governmental agencies. A number of W. P. A. projects also were instituted under trained leadership for the control of rodents to protect crops, range lands, soil-conserving structures, and silvicultural plantings. In numerous campaigns throughout the country the Survey cooperated with States, counties, cities, civic organizations, and State and local health departments for the suppression of the common house rat. On areas that had been treated for the eradication of field rodents in previous years, control was maintained through policing to prevent reinfestation.

Rodents and Communicable Diseases

New cases of sylvatic plague carried by rodents were reported for the following animals: Prairie dogs, in Sweetwater County, Wyo.; ground squirrels, in Fremont County, Idaho; Spokane County, Wash.; Wallowa County, Oreg.; and Elko County, Nev.; golden-mantled ground squirrels, in Eldorado County, Calif.; and rabbits, in Lincoln County, Wash.

In the lower Rio Grande Valley, Tex., cases of typhus fever increased alarmingly, 120 having been reported from Hidalgo County and 100 from Cameron County. In Kleberg County, where two deaths were reported, the disease was so prevalent that entire fam-

ilies avoided theaters and other public gatherings. To reduce the infection, rat control was instituted in these areas.

A project was inaugurated in Pierce County, N. Dak., in cooperation with the State Health Department, to suppress an epizootic of rabies, where rats had become infected and were partly responsible for its spread. A study was begun, in cooperation with the Food and Drug Administration of the United States Department of Agriculture, to determine the influence of rats in spreading the organism responsible for food poisoning.

Instances of Rodent and Rabbit Damage

Rabbits.—In the Kearney district and adjacent areas in Nebraska an exceptionally dry summer and fall caused especially severe jack rabbit damage. On individual farms, losses of as much as 30 acres in fall wheat were sustained and whole fields of clover and alfalfa were literally dug out. Jack rabbits defeated a project for the stabilization of sand dunes in Bent County, Colo., by completely destroying plantings made to obtain a stand of sod. In a nursery at Yankton, S. Dak., cottontail rabbits caused \$3,000 damage by girdling 5,000 apple trees.

Pocket gophers.—In Star Valley, western Wyoming, pocket gophers consumed an 80-acre field of dry-land alfalfa, making plowing and reseedling necessary. The cost of establishing the original stand was \$5 an acre. In requesting pocket gopher control work, the vice president of the Valley Land Co., at Malaga, N. Mex., wrote that the company was annually threatened with disastrous washouts in the main canal, caused by pocket gophers undermining the bottom and sides, and that repairs after several such washouts had cost thousands of dollars.

Other rodents.—Rat damage in rural sections of Crawford County, Ill., was reported by officials to amount to \$25,000 during the year. In rural sections of the North Central States the damage from rat infestations reached an all-time high during the fall of 1939. One fruit grower in the vicinity of Dupont, Ind., reported that field mice girdled 600 fruit trees, the greater proportion of which died as a result. Many growers in the fruit sections of the North Central States lost 25 to 150 trees in individual orchards through the depredations of field mice. Girdling by porcupines destroyed more than half a planting of red spruce near Cabot, Vt.

Benefits of Rodent Control

Following are a few of the typical benefits derived from the control of economically injurious rodents.

Pocket gopher control conducted on Reclamation Service projects in El Paso County, Tex., during the past 5 years has reduced the water loss 70 percent. The previous extremely heavy water losses were occasioned by leakage and washing through pocket gopher tunnels, but during the past year there have been no major breaks in canals or laterals. The carrying capacity of range lands in Chavez and Eddy Counties, N. Mex., has been increased 50 percent following prairie dog control conducted a few years ago. Of the 37,999 premises treated in a cooperative control campaign in the North Central States during the fall, 47 percent were free from rats after the first baiting, thus resulting in material savings to stored feed.

WILDLIFE CONSERVATION IN ALASKA

CHANGES IN REGULATIONS

The 1940-41 regulations under the Alaska game law, published in Circular AGC-18, the first to be issued by the Secretary of the Interior since the transfer of this function from the Secretary of Agriculture, contained few changes of material importance. A closed season is provided on martens throughout the Territory and on all fur animals in fur district 1, embracing southeastern Alaska. Beavers may be taken in fur districts 2, 4, 5, and 6, and the limit is 10 to each trapper. Open-season dates on other fur animals were adjusted.

A uniform season throughout the Territory was fixed on caribou, with a limit of 3 for residents and 2 for nonresidents. Shooting these animals is prohibited in an area 1 mile wide on either side of Steese Highway between mileposts 69.8 and 116. Moose are given added protection in a closed area half a mile on either side of all public highways in the First and Third Judicial Divisions. The seasons on mountain goat and mountain sheep were each shortened 15 days. On grouse and ptarmigan they were advanced to August 20 and the limits reduced to 10 grouse and 15 ptarmigans and an aggregate limit of 15. Black bears are afforded protection in the Loring area, and all species on sanctuaries, including the Wrangell-Shoemaker area on Wrangell Island and the Haines area embracing the drainage of the Klathini River.

For the first time in its history the Alaska Game Commission held its annual meeting elsewhere than at Juneau, and much favorable comment resulted. It met at Anchorage late in February with a twofold purpose: To make it possible for residents of that area to appear before the Commission to express their views on the regulations and for all the wildlife agents to be present.

LAW ENFORCEMENT

The use of airplanes has added materially to the effectiveness of law enforcement in Alaska, and one 2-place cabin airplane was purchased for service out of Fairbanks and two 4-place machines were ordered for early delivery. Wildlife agents were assigned to Sitka and to Kodiak Island. Cases of unusual importance successfully terminated by the Alaska Game Commission included the prosecution of two fur dealers who were fined \$500 and \$750, respectively, in the United States District Court at Ketchikan for failure to keep proper records; the seizure of 150 extra-large illegal beaver skins, currently valued at about \$4,000; and the apprehension in the remote Mount Hayes district, by aid of an airplane, of one of the worst game offenders ever known to the Commission. In this case, the agents seized the meat of 21 game animals, including 11 mountain sheep, 1 lamb, 2 cow moose, and 7 caribous; discovered 34 ram horns under a tree, most of which represented fresh kills; and found that the violator had fed mountain sheep to his dogs. Pleading guilty, the violator was fined \$150 and sentenced to jail for 5 months.

For the 246 violations reported, 32 of which involved aliens, fines aggregated \$6,985 and jail sentences, 3,148 days. The 381 furs seized included pelts of 202 beavers, 61 minks, 22 martens, 17 red foxes, 6 cross foxes, 11 blue foxes, 4 white foxes, 16 lynxes, 28 weasels, 8 otters, 3 wolverines, 1 wolf, and 2 coyotes. Deer, moose, mountain sheep, and caribou meat seized weighed 2,167 pounds. Other seizures included 1 brown and 1 grizzly bear, 178 traps, 26 resident hunting licenses, 58 firearms, and 1 duck stamp. The estimated value of the confiscated furs and traps was \$7,105.50.

WILDLIFE RESTOCKING PROJECTS

Some 800 pheasant eggs, obtained through the cooperation of the Washington State Game Department, were hatched at the Territorial experimental station at Petersburg, in the vicinity of which also several broods of pheasants were hatched in the wild. In the Wrangell Reserve area, 150 Mongolian pheasants were liberated and 100 are to be shipped to the Kenai Lake area in July, the first pheasant-stocking projects in these districts. Most of the pheasants received from the Wisconsin State Conservation Department last year, consisting of eared (blue and brown), Cheer, Reeves, and Kaleege varieties, wintered fairly well and laid eggs.

On Kodiak Island, beavers, muskrats, and snowshoe hares have increased splendidly, and the restocking projects there are reported to be doing exceptionally well. The 8 elk placed on Afognak Island in 1927 have increased until now there is one herd of 100-odd animals

and smaller herds, possibly of 50 to 75 each. The 19 buffaloes transplanted from Montana to the Big Delta area near Fairbanks in 1928 have increased to nearly 200. Several bands have resulted from the 18 mountain goats transferred from the mainland near Juneau to Baranof Island near Sitka, one of which it is estimated consists of 75 animals, and there are possibly 200 animals in all. Musk oxen transplanted in the Nunivak Island Wildlife Refuge are reported to number more than 90.

PREDATOR CONTROL

One predatory-animal hunter took a count during the winter of the wolves and coyotes in the Mount Hayes area, where more have been taken than in previous years, and studied their effect on game animals. All claims for the Territorial \$20 bounty on both animals are required by law to be certified by agents of the Alaska Game Commission, a proviso that has resulted in a considerable saving in avoiding payment of fraudulent claims.

BIOLOGICAL INVESTIGATIONS

Field research included a study of spring calving of the Kenai moose, a range and wildlife survey of the Matanuska-Susitna Valley, an investigation of the buffaloes in the interior, and continuation of Kodiak bear-cattle investigation. A few brown bears, said to have been stock killers, were taken under permit. Few kills by the bears were reported, and with the situation apparently well in hand, further damage should be negligible. A visit was made to Mount McKinley National Park for cooperation with the National Park Service in a study of wolf-mountain sheep relationships.

The range and wildlife survey of Matanuska-Susitna Valley was begun as part of a cooperative soil and land-use survey, and the preliminary reconnaissance indicated that (1) the woodland valley range of the immediate colony unit is generally of low grazing capacity and may be improved by clearing and seeding to bluegrass, fescue, wheatgrass, Dutch clover, and other cultivated forage species; (2) the mountain ranges are suitable for grazing livestock, and the estimated capacity for a 4-month summer season is 21,000 cattle and 60,000 sheep; (3) the area has an abundant wildlife population; (4) the present take of moose, sheep, and mountain goats is not excessive and may be continued; and (5) fishing furnishes the chief means of livelihood for 1,332 residents about Cook Inlet.

ALASKAN BIG GAME

The Alaska Game Commission estimates that more than a million big-game animals range over the Territory's wilderness areas. About 42,000 Sitka black-tailed deer are to be found in the humid southeastern

part of Alaska. Moose are particularly abundant on the Kenai Peninsula and in Rainy Pass. The caribou is still the most abundant big-game animal in Alaska, even though its numbers have been reduced. Once this animal moved across the Alaskan tundras in spectacular massed migrations that included herds of thousands of animals in areas where now there are only hundreds. In an effort to halt further decline, stricter regulations have been adopted and closed areas have been established along the highways, where these animals may be free to cross without being subjected to hailstorms of lead from passing motorists. Mountain sheep and mountain goats are maintaining their numbers and doing well. The various bears are more than holding their own—the grizzlies show little if any fluctuation; black bears are plentiful; the big brown bears show definite signs of increasing numbers; and in the far north the great white polar bears are more numerous than for a decade. Big-game hunters shipped out 217 trophies during the year, nonresident and alien hunters accounting for 134 animals and resident exporters for 83. Included were 39 moose, 35 mountain sheep, 8 mountain goats, 20 caribou, 11 deer, 73 large brown and grizzly bears, and 31 black bears.



CONSERVING AQUATIC RESOURCES.

Upper: Fur-seal harems on St. Paul Island, Alaska, one of the areas where the conservation work of the Bureau of Fisheries protects the supply of an important natural resource.

Lower: Stocking an improved mountain stream with rainbow trout forms an interesting angle of Bureau of Fisheries activities for the conservation of natural resources in the seas, rivers, and lakes of the Nation.

BUREAU OF FISHERIES

Charles E. Jackson, *Acting Commissioner*

ORIGINALLY established on Feb. 9, 1871, as the United States Commission of Fish and Fisheries, an independent agency, and redesignated the Bureau of Fisheries on July 1, 1903, when it was by law included in the newly created Department of Commerce and Labor, this Bureau has completed 69 years of active service in the field of fishery conservation.¹

During the past year encouraging progress was made in the development of practical programs of fishery management and in securing State and private cooperation in support of these programs. Biological investigations contributed much fundamental information that will assist in maintaining the productivity of the fisheries. Technological investigations contributed substantially to the development of better methods for the preservation of fishery products and to the more complete utilization of byproducts. Statistical studies provided a measure of abundance for most of the commercial and game species, thus furnishing a basis for regulation and assisting in the orderly production and distribution of fisheries commodities.

During periods of world disaster, such as wars and famines, the problem of supplying wholesome and nutritious foods in sufficient quantities is of paramount importance to the Nation—not only as it affects the armed forces, but the country as a whole. Such a condition prevailed during the last World War and is likely to again occur should similar conditions arise.

Under authority of the Secretary and the absolute control of the Bureau of Fisheries, the Alaska salmon in 1917 provided the fisheries resource from which the pack was increased over that of 1916 by about 25 percent, or 2,520,128 cases. This increased production on short notice is indicative of the ability of the Bureau to so regulate these fisheries as to constantly maintain a reserve upon which to draw.

¹ This, the Sixty-ninth Annual Report of the Bureau of Fisheries, is the first submitted to the Secretary of the Interior and the last to be made as the Bureau of Fisheries. In accordance with the President's Reorganization Plan No. II, this Bureau was transferred from the Department of Commerce to the Department of the Interior on July 1, 1939; and by Reorganization Plan No. III it was merged with the Bureau of Biological Survey on June 30, 1940, to form the Fish and Wildlife Service.

The Bureau has remained cognizant of the real and potential value of this vast food resource which has been intrusted to its keeping and, although continually providing the markets of the world with a canned fishery product of unquestioned excellence, it has constantly maintained a balance sufficient that should the need arise, production can again be stepped up to the required level.

In carrying on the work of the Bureau it has been necessary to maintain a number of vessels which, although designed primarily for specialized fishery activities, could readily be converted for use by the Navy in times of national emergency. The Bureau fleet could be augmented by hundreds of fishing craft and thus form a defense unit that would contribute materially to the conduct of naval operations.

SUMMARY

Data on the 1938 catch of fishery products were collected in all sections of the United States and Alaska except the Mississippi River area. The combined catch in the areas surveyed shows a decline of 2 percent in volume and 7 percent in value as compared with the catch in the same sections during the preceding year. Decreased catches were made in each of the geographical sections except the Chesapeake Bay and South Atlantic and Gulf States. Marked declines in the value of the catch occurred in the New England, South Atlantic and Gulf, and Pacific Coast States, and in Alaska. The value of the pack of canned fishery products in all sections declined 21 percent as compared with 1937; byproducts decreased 17 percent; cured fish about 5 percent; and packaged fish, 2 percent.

The total catch of fishery products in the United States and Alaska, as based on the most recent surveys, amounted to 4,253,445,000 pounds, valued at \$93,547,000. Slightly more than 130,000 fishermen were employed in making this catch.

The production of canned fishery products in the United States and Alaska during 1938 amounted to 667,527,840 pounds, valued at \$83,445,889; the output of byproducts was valued at \$30,576,367; the production of frozen fishery products, excluding packaged products, amounted to 117,125,519 pounds, valued at \$7,800,000; and fresh and frozen packaged fish and shellfish, 216,661,255 pounds, valued at \$27,243,645. Based on surveys for 1938 in all sections except the Mississippi River area, and for 1931 in that area, the production of cured fishery products amounted to 102,617,256 pounds, valued at \$14,865,530. It is estimated that about 680,000,000 pounds of fresh fishery products (excluding packaged fish and shellfish) valued at about \$50,000,000 were marketed during 1938. The total marketed

value to domestic primary handlers of all fishery products in 1938 is estimated at \$214,000,000.

INTERNATIONAL RELATIONS

HALIBUT INVESTIGATIONS

Under authority of the treaty of January 29, 1937, the International Fisheries Commission continued the regulation of the Pacific halibut fishery and carried on the scientific investigations of the halibut and its fishery, which form the basis for regulation.

The representation of the United States on the Commission was changed during the year. Mr. Frank T. Bell, who had been a member of the Commission since July 31, 1933, resigned effective January 31, 1940. Mr. Charles E. Jackson, Acting Commissioner of the United States Bureau of Fisheries, was appointed to succeed him. The membership of the Commission at the end of the year was: Mr. L. W. Patmore and Mr. A. J. Whitmore, for Canada; Mr. Charles E. Jackson and Mr. Edward W. Allen, for the United States.

Meetings of the Commission were held at Seattle on July 7 and December 12, 13 and 14. At the latter meetings, Mr. L. W. Patmore was elected Chairman and Mr. Edward W. Allen was elected Secretary for the ensuing biennium.

In fulfillment of its regulatory duties, the Commission determined the catch limits necessary for each regulatory area, recorded the catch from each area, forecast and announced the date of attainment of each area limit and closed the areas accordingly. In 1939, areas 1 and 2, which include all halibut-fishing grounds south of Cape Spencer, Alaska, were closed to halibut fishing at midnight July 29. The total catches were 1,068,000 and 24,309,000 pounds, respectively, for the two areas. Of the area 2 catch, 373,000 pounds were taken under permits while fishing for other species after the closure of that area. Areas 3 and 4, which include all the halibut-fishing grounds north and west of Cape Spencer, were closed at midnight October 28 with catches of 25,360,000 pounds and zero pounds respectively.

The 1940 fishing season was opened on April 1 under regulations issued on March 25, 1940. Several changes were made in these regulations to facilitate enforcement and to assure limitation of the catch to the prescribed poundage which is as much as is justified by the present condition of the stock. Possession of undersized halibut was prohibited, fishing was restricted to one area on any one trip, and provision was made for the examination of all records dealing with the landing, purchase, and sale of halibut. At the request of the fleet, the method of closure of area 3 was changed to conform to that of area 2.

Investigations necessary for the fulfillment of the purposes of the treaty were continued by the scientific staff of the Commission. These included the collection and analysis of current statistical and biological data which serve as a measure of the changes occurring in the stocks of halibut as a result of regulation and which are a necessary basis for the continued rational control of the fishery. The biological investigations made necessary the operation of two vessels.

Tagging operations were carried on from a chartered halibut vessel during the winter spawning season in area 2. A total of 1,303 halibut were marked in northern British Columbia and southeastern Alaska. From the recovery of these marked fish it is anticipated that valuable information will be obtained concerning the relationship of the spawning populations to the other stocks within area 2 and regarding the rate at which these spawning populations are being removed by the fishery. Materials for the study of age, growth, sex, and state of maturity were also collected during the operations.

Measurements of halibut landed by the fleet were continued to determine the changes occurring in the size composition of the marketable fish as a result of regulation. Material for the age studies was collected at the same time. Preliminary analysis of the measurements of area 2 fish has failed for the second successive year to show any increase in the average size or in the proportion of larger, and therefore mature fish.

The abundance of halibut as shown by the catch per unit of gear fished did not show the improvement that has characterized the catch of the previous eight years. The abundance in area 2, between Cape Spencer in Alaska and Willapa Bay in Washington, was 12 percent lower in 1939 than in 1938, which brought it back to the 1937 level. No change in abundance from that of the previous year was indicated in area 3, where the stocks are in good condition. Although the abundance in area 2 is still 71 percent greater than in 1930, the last year of unrestricted fishing, the marked decrease in abundance in that area must be regarded with concern in view of the unsatisfactory condition of the spawning stocks there.

The effects of regulation upon the production of spawn in area 2 were again observed by means of net hauls taken at sea during the winter spawning season. Analysis of these observations shows that the decline in abundance of eggs from the peak of 1936-37 was continued for the third consecutive year. While some fluctuations may be expected, due to variations in spawning conditions and spawning stocks, the occurrence of such a continuous decline must be regarded as serious. In view of the decreased catch per skate and the un-

favorable trend in the size composition of the marketable sizes of fish in area 2, the decline in production of eggs indicates a decrease in the abundance of spawners in that region that may be expected to have a further unfavorable effect upon the fishery when the young produced by these spawnings enter the fishery 5 or 6 years later.

The most satisfactory explanation, at the present time, of the unfavorable trend in the area 2 stock must be the large amounts of halibut which are known to have been taken recently, both legally and illegally, in excess of the catch limit assigned to the area. It is apparent that a sharp reduction of these excess catches will be necessary to assure the maintenance of past improvements and to make possible further improvements in the condition of the stock.

The investigations of the Commission continued to measure the changes taking place in the stocks of halibut on the banks. They prove that the halibut fishery is still in a critical condition and that more effective enforcement of regulations is needed. They indicate that more intensive investigations than have been possible in recent years are necessary to guide the Commission's future actions.

THE INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION

The sockeye salmon season of 1939 was the second since proclamation of the Convention between Canada and the United States for rehabilitation of the Fraser River fishery for that species, one of the greatest of modern conservation projects.

The purpose of the Convention is to rebuild the great runs of sockeye to the Fraser River system of British Columbia. The "big" run of every fourth year until 1913 would be worth \$30,000,000 at present prices, but the largest of recent years has been worth about \$4,500,000. To restore these runs, the International Pacific Salmon Fisheries Commission was created, consisting of three members from Canada and three from the United States, in 1939, as follows: A. L. Hager, Chairman, Vancouver, British Columbia; E. W. Allen, Seattle, Wash.; C. E. Jackson, Washington, D. C.; A. J. Whitmore, Ottawa, Ontario; Tom Redi, New Westminster, British Columbia; and B. M. Brenman, Secretary, Seattle, Wash.

The Commission has selected Dr. W. F. Thompson as Director of Investigations.

It is provided in the understandings attached to the Convention that "The Commission shall not promulgate or enforce regulations until the scientific investigations provided for in the Convention have been made, covering 2 cycles of sockeye salmon runs, or 8 years." The first concern of the Commission during these first years has therefore been the scientific investigations, but the study of natural and artificial

obstructions and the use of methods of assisting propagation have received attention.

As required by the understandings attached to the treaty, the Commission has chosen an Advisory Committee from the industry. It has also chosen a scientific council with which the Director of Investigations and staff can consult.

During 1939, the Commission met in Vancouver on July 2, 3, and 4. The midwinter meetings were held in December 1938 in Ottawa and January 1940 in Washington, D. C. The Advisory Committee met with the Commission during the July meetings. The Scientific Council met with the Director in August.

At these meetings the Commission discussed and approved the program necessary. It agreed upon the funds required, since the money appropriated by the respective Governments would decide whether this program could be carried out. Furthermore, since the expenses of the Commission are joint in character, to be discharged in equal shares by the two Governments, the smaller of the two appropriations made must be the limiting one, and it was agreed that a special effort must be made to secure the needed amount from both.

The needs of the Commission are evident from the nature of its duties. Once established, the main features of the research program must be continued from year to year until the necessary information is obtained over at least one cycle. The sockeye of the Fraser River tends to return as a 4-year-old, so that the runs occur in cycles of 4 years. The runs of each year of the four are assumed by current scientific opinion to be more or less independent, very likely composed of different "races" occupying each a home stream to which it returns. Within a 4-year cycle each such race would therefore recur and any program to determine these races, their characteristics and home streams, must cover at least 4 years. Furthermore, the initial investigations must, of course, be exploratory and preliminary, as they have been in 1938 and 1939, and it must be expected that the funds required will increase as the program matures.

During the meetings in 1939, the Commission discussed and approved the extensions of the program it considered vital for the purposes of the Convention. With the "thorough investigation into natural history" already well under way, it was considered that the remaining duties of the Commission, as stated by the Convention, should receive attention by certain extensions of its program. These extensions are those specifically called for by the Convention. They cover the adoption of methods of assisting propagation and the study of obstructions, natural or artificial, in order that recommendations might be made regarding them. The Commission unanimously de-

cided upon, and has requested of the two Governments, the additional funds necessary to inaugurate the required engineering and biological studies. Until such are received, important phases of the duties outlined by the Convention must remain in abeyance, a fact which the formal action of the Commission emphasizes.

The investigations of the Commission were reviewed at the mid-winter meeting in Washington, D. C. With special emphasis upon facts necessary for regulation, they covered the migrations of the races of adult sockeye, their abundance, rate of movement, and time of passage through salt and fresh water to their spawning grounds. The effect of obstructions upon migration, the extent and nature of the spawning grounds, and factors influencing the success and failure of spawning were surveyed.

As in 1938, sockeye were tagged at Sooke, at various places in Puget Sound and the Gulf of Georgia, and at Hell's Gate in the Fraser River canyon, for study of the migration and habits. The returns were extraordinarily high. At Sooke 1,051 fish were tagged, and 51 percent returned, as compared to 44 percent in 1938. As before, those tagged prior to the first week in July were returned from rivers other than the Fraser. Of other tagging in salt water, 6,152 fish were tagged, and 65 percent recaptured, as compared to 2,587 tagged and 47 percent recaptured in 1938. At Hell's Gate 4,344 fish were tagged and 54 percent returned, as compared to 2,128 and 27 percent in 1938. The operations were continued over the full season, instead of about half as in 1938. Analysis of the returns is underway.

At Hell's Gate the time of passage and degree of obstruction to movement were studied. The run past that point was found to be divisible into sections, each bound for a different part of the Fraser River; exceedingly valuable information for regulatory purposes.

Observers were again stationed at the canneries for sampling of the catch, recovery of tags, and gathering of statistics. Others were stationed in the several sections of the Fraser watershed to estimate and take samples of the escapement, recover tags, survey the grounds, and report on obstructions. As before, there was the closest cooperation with the officers of the Canadian Department of Fisheries.

It was obvious that despite the utmost vigilance, enumeration of the escapement by existing methods was neither accurate nor complete. Accordingly the successful experiment on a relatively simple method tried at Cultus Lake and described in last year's report was this year extended to the Harrison-Birkenhead system, tributary to the Fraser. Traps and weirs were constructed and the runs there studied closely as a preliminary to a more extensive experiment in 1940, if funds become available. It is now clear that here, as in the main river, there

is a definite sequence of runs bound for different sections, and that a large proportion of the sockeye which passed were not subsequently observed in the estimation of the spawning population.

During the year a biometric study was made of the races within the Fraser and in other rivers to which sockeye caught with Fraser River fish are bound. A great mass of data was collected and has now been analyzed in part.

The experiments at Cultus Lake with methods of estimating escapement were carried further. At the same time the experiments on the control of predators and the factors influencing the survival of young, as well as their natural history, originated by the Fisheries Research Board of Canada, were continued.

The collection of statistics and materials for a general history of the Fraser River and its sockeye runs was continued on an extensive scale.

COOPERATION WITH FEDERAL, STATE, AND OTHER AGENCIES

The Division of Fish Culture is vitally concerned in placing its product—fish and eggs—in environments where the greatest dividends will be derived from stocking. Because the Bureau's staff of biologists has been entirely inadequate to conduct surveys of all the inland waters of the United States, fish applications from individuals and clubs are submitted to more than 20 State fish and game commissions for approval before stocking the specified waters with the species requested. In some States the authorities stipulate the species, number, and size that will give best results, while in others the stocking programs have been formulated and the combined output of the State and Federal hatcheries has been budgeted to conform to these programs. The exchange of eggs and fish, especially trout (*Salmonidae*) and related species, has been of mutual benefit in a number of States.

In view of the tremendous amount of angling in the waters within the national forests, there has been close cooperation between the Forest Service of the Department of Agriculture and the Bureau in an effort to maintain good fishing in those areas. More than 20,449,000 fish were assigned to the Forest Service for the stocking of suitable waters during the past year. Trout-rearing units were operated in the Chattahoochee, Natahala, Pisgah, Allegheny, Huron, Marquette, Chequamegon, and Superior National Forests, and approximately 11½ million trout were reared to large fingerling, or legal size before liberation.

The Bureau continued to cooperate with the National Park Service in the restocking of waters under its control. It appears that an all-time record will be established with regard to the number of black-

spotted trout eggs collected from waters in Yellowstone Park this season.

In the Tennessee Valley area, 3-way agreements between the Bureau of Fisheries, the Tennessee Valley Authority, and the States of Alabama, Tennessee, and North Carolina have been made effective. The Tennessee Valley Authority has completed a pondfish hatchery having a water acreage of 111 acres on the Elk River in Alabama. The personnel assigned to that hatchery is now collecting brood stock and treating the pond bottoms to reduce the loss of water through seepage. The hatchery operated at Norris, Tenn., was enlarged during the year. The State conservation departments will distribute the fish produced at these units for the stocking of waters in that part of the Tennessee Valley area within their respective State boundaries.

The New Jersey Board of Fish and Game Commissioners donated the services of its staff for the surveying of potential Federal pondfish hatchery sites in New Jersey. Further assistance was received from various State agencies in setting up W. P. A. projects to cover extensive construction programs at Federal hatcheries.

The Bureau of Reclamation has continued its efforts to preserve the runs of salmon in the Columbia and Sacramento Rivers, where the survival of this species is threatened by huge dam-construction projects. In connection with this work, one of the four salmon hatcheries originally contemplated has been partially completed and placed in limited operation.

CONSTRUCTION ACTIVITIES

The major part of fish-hatchery construction during the year was in continuation of projects previously started. The 1940 appropriation carried funds for the establishment of hatcheries in Illinois and New Jersey, a substation in Maine, and/or the enlargement of the East Orland (Maine) Hatchery. Difficulty in selecting a site, and absence of State enabling legislation, prevented any action in Illinois. In New Jersey it was not possible to obtain a suitable site at a price low enough to permit adequate development.

A site near Salem, Maine, was selected for a small trout-rearing and bass-cultural unit, and the title was cleared late in the year. Construction of this unit was not started prior to June 30. At the East Orland station, buildings and ponds were rehabilitated and provision was made for resumption of the propagation of Atlantic salmon.

All of the appropriations for the above projects were continued available and none of the projects were abandoned.

At the start of the year previously approved hatchery projects at Hebron, Ohio; New London, Minn.; and Farlington, Kans., en-

tered a more active phase of construction. At the two former, appropriated funds were supplemented by W. P. A. allotments, with a large work camp assigned to New London. Construction of the Kansas project was retarded by adverse weather conditions, and none of the establishments were developed to the point where fish-cultural work could be undertaken at the close of the year.

Toward the end of the 1939 fiscal year, allotments of P. W. A. funds were made available which provided \$30,000 for the construction of a bass hatchery at Carbon Hill, Ala., and \$60,000 for the development of fish-cultural facilities in Yellowstone Park. Of the latter sum, \$20,000 was reallocated for the construction of the Glacier National Park hatchery at Creston, Mont. With the exception of the Yellowstone Park project, these jobs were nearing completion at the end of the year. The construction of the Glacier Park hatchery was taken over by the Bureau when the project was in an incomplete status. This work was initiated by the National Park Service, and upon the exhaustion of funds available to that agency it was necessary for the Bureau to assume the responsibility for completion.

W. P. A. allotments totaling \$188,047 were allocated to 20 fish-cultural stations for repairs, improvements, and further developmental work. Among the projects undertaken was the construction of four rearing ponds at Moorefield, W. Va., to serve as an auxiliary to the Leetown (W. Va.) Station. This allotment supplemented the regular construction appropriations. Seventeen projects of a similar nature, which had been financed by W. P. A. allotments during the previous year, were continued in operation until these funds were expended. In addition, several W. P. A. projects were approved under State quotas covering similar work. The flexibility permitted under the procedure of transferring W. P. A. funds to the Bureau has been of great value in meeting unforeseen contingencies at the numerous field stations.

JAPANESE ACTIVITIES IN BERING SEA

As was the case during a number of previous seasons, the Japanese training ship *Hakuyo Maru*, of the Tokio Fisheries Institute, made a cruise in North Pacific waters. She visited St. Paul Island on July 11 and 12, thus giving the students a chance to become familiar with fur-seal operations at the Pribilof Islands.

Crab-fishing operations were conducted again in the season of 1939 by the Japanese vessel *Toten Maru*, accompanied by 3 self-navigating tenders and carrying 10 launches. The chief place of operation was in the open sea between 55° and 57° north latitude and between 163°30'

and 168° west longitude. These operations were discontinued by the middle of May and did not interfere with the salmon fishery in that region.

ALASKA FISHERIES SERVICE

ADMINISTRATION OF FISHERY LAWS AND REGULATIONS

Operations in the Alaska fishery industry were observed closely in all areas by field agents of the Bureau, and regulations with respect to commercial fishing were modified during the progress of the season, as circumstances warranted, to permit the fullest possible utilization of the fishery resources consistent with conservation requirements. The Acting Commissioner of Fisheries spent several weeks in the Territory studying problems of fishery management. Following the close of the fishing season he initiated the policy of holding annual hearings in the various fishing centers in order to obtain the views of those engaged in the industry with regard to regulatory measures.

Revised regulations for the protection of the commercial fisheries of Alaska were issued by the Secretary of the Interior on January 4, to be effective in the 1940 season. The new regulations were based upon the evidence presented at the Alaska hearings and in supplemental briefs, as well as upon data gathered by the Bureau's patrol force and biological investigators. Commercial salmon fishing in the Bristol Bay area was restricted to approximately 50 percent of normal operations for the purpose of rebuilding the weak cyclical run of red salmon which occurs in this area in the years divisible by five. The weekly closed period was increased to 60 hours in the Prince William Sound area and in most sections of southeastern Alaska, in order to provide a more continuous escapement of pink salmon throughout the season. In the southeastern Alaska area commercial fishing for herring was prohibited except by gill nets or for bait purposes, and in the Prince William Sound and Kodiak areas herring-catch quotas were established to prevent depletion. Other changes in the regulations included slight modifications of seasons, limitations upon the size of nets, and restrictions upon waters open to commercial fishing. One feature was the closure of 20 salmon fish-trap sites previously open to this type of apparatus.

Separate regulations were issued on May 28, 1940, with regard to the protection of game fish and other fish in the fresh waters of Alaska, as distinct from the regulations pertaining to the commercial fisheries. The publication of separate sport-fishing regulations was found advisable in view of the rapid development of sport fishing in the Territory in recent years. The new regulations define game fish and

establish limitations on the time, means, methods, and extent of sport fishing in the fresh waters of Alaska.

A congressional investigation of the Alaska fisheries was begun during the summer of 1939 by a subcommittee of 7 members of the Committee on Merchant Marine and Fisheries. The subcommittee was assisted by a joint committee of 4 members from the Territorial legislature. This investigation was concerned primarily with the use of traps in catching salmon, the advisability of maintaining or changing the prescribed fishing seasons, the effect of herring fishing operations upon the salmon fishery, offshore fishing by foreign nationals for crabs and salmon, and other matters concerning the conservation of the fisheries of Alaska and a reasonable development of the fishing industry.

The congressional committee held public hearings at nine important fishing centers in Alaska and one hearing in Seattle, Wash., in the course of the investigation. At each hearing supplemental statements and briefs were invited, and these, together with much additional information of a factual nature, were made a part of the record of the hearings. A report of the investigation, together with recommendations of the committee, was published as Report No. 2379 under date of June 5, 1940.

Dr. Carl L. Hubbs, of the University of Michigan, was engaged to make a special investigation of the fisheries of Alaska on behalf of the Secretary of the Interior in the season of 1939. Dr. Hubbs covered the Territory widely, including a visit to the Pribilof Islands, and upon his return in the fall submitted an exhaustive report.

Under the authority granted by the act of August 2, 1937, for the protection of oyster culture in Alaska, a 6-year lease was executed for 100 acres of bottoms in Alaska. This is the third such lease to be executed under the act. An output of 52 gallons, or 455 pounds of oysters was produced in the Ketchikan district in 1939. This is the first reported commercial production of oysters in Alaska waters, although there has been some experimental cultivation since 1931.

A patrol of the fishing grounds was maintained by 14 Bureau vessels, 1 chartered vessel, 5 speedboats of the Bureau, and numerous small craft. As in previous years, chartered airplane service was used to some extent to supplement the vessel patrol, and also for surveys of spawning grounds and transportation of officials to isolated districts. One hundred and seventy-eight persons were identified with fishery law-enforcement work, including stream guards, weir operators, crews of patrol vessels, wardens, and biologists.

In a few isolated regions, funds provided by the Territorial legislature and by local fishery operators were used to continue the payment

of bounties on predatory trout that feed upon salmon eggs and fry. This work is administered by the Bureau in connection with the regular patrol of fishing grounds. Studies of the Dolly Varden trout were continued in the Kodiak area, and considerable numbers of these predators were destroyed by employees in charge of salmon-counting weirs.

PRODUCTS OF THE FISHERIES

The total production of the Alaska fishery industry in 1939 was somewhat less than in the previous year, notwithstanding an increase in the number of plants and persons employed in the industry. The total output was 368,536,000 pounds, valued at \$40,104,000, as compared with 446,664,000 pounds, valued at \$42,870,000, in 1938. The estimated value of the 1939 catch to the fishermen was about \$11,321,000, or approximately \$719,000 less than in the preceding year. There were 30,572 persons employed in the various branches of the industry, as against 28,084 in 1938.

Salmon products represented 73 percent in volume and 91 percent in value of the total fisheries output in Alaska in 1939. Ninety-three percent of the salmon products consisted of canned salmon, the pack amounting to 5,263,000 cases, or 252,631,000 pounds, valued at \$34,441,082. Red salmon comprised 37 percent and pinks 48 percent of the total pack of canned salmon, as against 37 percent and 47 percent, respectively, in 1938. As compared with the pack in the preceding year, the output of canned salmon in 1939 showed a decrease of about 23 percent in quantity and about 6 percent in value. One hundred and nine canneries were operated in Alaska in 1939, or 11 more than in the previous year, and the number of persons employed in the salmon-canning industry increased from 22,280 in 1938 to 24,921 in 1939.

There were 21 herring plants operated in 1939, as compared with 17 in the previous year. Products of the herring fishery were valued at \$2,090,000, an increase of about 2 percent over 1938. Halibut landings were slightly less in 1939 than in the previous year, and many of the minor fishery products, including clams, shrimp, and crabs, also were less than in 1938.

ALASKA FUR-SEAL SERVICE

General Activities

Sealing and foxing operations were carried on as usual by the native inhabitants of the Pribilof Islands under the supervision of the Bureau's staff. Approximately 80 additional natives from the mainland and Aleutian Islands were employed during the summer to assist with fur-seal activities, and 25 employees of the Fouke Fur Co. also

were detailed to the islands for several months to assist in the curing and packing of the skins.

The byproducts plant on St. Paul Island was in operation again, rendering oil and meal from seal carcasses and blubber. The total production for the season amounted to 32,809 gallons of oil and 502,914 pounds of seal meal. Small quantities of these products were retained at the islands to be used for fox food, but most of the oil and meal was shipped to Seattle for disposition. About 75 tons of seal meal was delivered to the Division of Fish Culture for use in Federal fish hatcheries, and the surplus meal and oil were sold through competitive bidding for the account of the Government.

Four new frame houses were built for natives on St. Paul Island, and a new machine shop was almost completed. Other improvements included an addition to the boatways, the erection of a small pump-house, and the building of a reindeer corral. On St. George Island a new bunkhouse for natives was completed.

Annual supplies for the Pribilof Islands were transported from Seattle aboard the U. S. S. *Capella*, through the cooperation of the Navy Department. The Coast Guard also rendered valuable cooperative service in patrolling waters of the North Pacific and Bering Sea for the protection of fur seals and sea otters, and in giving other assistance in the Bureau's work.

The entire season's take of sealskins was shipped to St. Louis, Mo., to be processed and sold at public auction by the Fouke Fur Co. for the account of the Government, under the terms of the contract of June 9, 1939. In accordance with the terms of the fur-seal treaty of 1911, Japan will receive a 15-percent share in the proceeds of sale, and Canada will receive a like share. The Government of Canada discontinued the previous arrangement for taking delivery of the skins in kind.

The United States received a shipment of 210 Robben Island fur-seal skins, or 10 percent of the number taken by Japan in 1939. This represents the annual share due this country under the terms of the fur-seal treaty. The Department's selling agents at St. Louis, Mo., received the skins for processing and sale.

Seal Herd

The total number of animals in the Pribilof Islands fur-seal herd as of August 10, 1939, was 2,020,774. This is an increase of 148,336 over the computed number in the preceding year.

Take of Sealskins

In the calendar year 1939 a total of 60,473 fur-seal skins were taken on the Pribilof Islands, or 2,109 more than in the preceding

year. Of the total number 47,646 were taken on St. Paul Island and 12,827 on St. George Island. Insofar as possible the killings were confined to 3-year-old males, and a sufficient reserve of this age-class was left for breeding stock.

Sale of Sealskins

In the fiscal year 1940 two public auction sales of fur-seal skins were held at St. Louis. At the sale on October 2, 1939, a total of 21,764 Pribilof Islands sealskins sold for a gross sum of \$463,338.25. The sale included 8,030 skins dyed black, 8,516 dyed Safari brown, 5,100 dyed Matara brown, and 118 raw and partly processed skins. Matara brown is a recently developed color which was offered at this sale for the first time and proved very popular. On April 1, 1940, a total of 28,749 Pribilof Islands sealskins sold for a gross sum of \$585,687. This sale included 9,599 skins dyed black, 9,595 dyed Matara brown, and 9,555 dyed Safari brown. In addition, 210 sealskins from Japan and 2 confiscated skins brought \$3,150.75.

Sealskins disposed of at private sales, under special authorization by the Secretary of the Interior, consisted of 277 dyed black, 170 dyed Safari brown, 265 dyed Matara brown, and 32 raw-salted skins, which brought a total of \$17,224.89. In all, 51,469 fur-seal skins were sold for the account of the Government in the fiscal year 1940 for a total gross sum of \$1,069,400.89.

Foxes

The management of the blue-fox herds on the Pribilof Islands continued to be one of the important activities. During the winter of 1939-40 a total of 1,258 fox pelts were taken, including 377 blue and 8 white pelts from St. Paul Island, and 869 blue and 4 white pelts from St. George Island. Sufficient stocks were reserved for breeding purposes on both islands.

In the fiscal year 1939 there were sold at public auction 1,018 blue and 11 white-fox skins taken on the Pribilof Islands in the 1938-39 season. The blue pelts brought \$17,001.50, and the white pelts brought \$143, a total of \$17,144.50.

Fur-seal Skins Taken by Natives

The privilege of taking fur seals at sea is granted to aborigines dwelling along the Pacific coast, under provisions of the North Pacific Sealing Convention of July 7, 1911, although such sealing is restricted to primitive methods. In 1939 Indians under the jurisdiction of the United States took 61 fur-seal skins, and Indians under the jurisdiction of Canada took 576 sealskins, all of which were duly authenticated by officials of the respective Governments.

Fur-seal Patrol

Ten vessels of the Coast Guard were instrumental in enforcing the laws and regulations for the protection of fur seals and sea otters in the North Pacific and Bering Sea. One vessel of the Bureau of Fisheries also was assigned to patrol waters off the coast of Washington during the period of sealing operations by the native Indians.

Protection of Sea Otters, Walruses, and Sea Lions

Regulations for the protection of walruses and sea lions were continued in effect without change. The capture of these animals is permitted only under certain limited conditions. Sea otter investigations were made at the Amchitka substation, and for the first time observations were continued throughout the year. The killing of sea otters is prohibited at all times.

PROPAGATION AND DISTRIBUTION OF FOOD AND GAME FISHES

While subsequent revision may alter the totals slightly, it is evident that the output of fish and eggs at the Federal hatcheries during the fiscal year 1940 approximated 7,400,000,000. In comparison with the 8,042,000,000 production of the previous year, there was a reduction of approximately 7.9 percent, or 640,000,000 fish and eggs. This drop is in part attributed to a curtailment in production of cod, haddock, and flounders. Activity with this group is governed by weather conditions, and the intensity of local commercial fishery operations. Both of these factors were adverse during the winter of 1939-40, with a consequent retarding of the hatchery functions.

The principal reason for the apparent slowing down of Federal fish-cultural work was the fact that the production of whitefish and pike-perch, hitherto shown as derived from the Put in Bay (Ohio) Station, was dropped from the records. This work was taken over by the Division of Conservation of the State of Ohio, preparatory to the formal transfer of the hatchery property to the State, as authorized by Congress. This station produced its usual quota of these two species but is listed as a State activity, and its output is omitted from the Federal records. This situation was, therefore, responsible for a reduction of 340,000,000 fish and eggs as reported by the Bureau of Fisheries, although the hatchery continued its service to the fishing industry.

As a matter of fact 24 different species were distributed in increased numbers, among them 6 species of trout and one variety of Pacific salmon. Increases were also registered for shad, striped bass, buffalofish, and lobster. There was a reduction of approximately 1,000,000 in the output of the black basses, which are also

subject to adverse weather conditions during the spawning season. Some 45 different species were handled at the various hatcheries.

Despite the reduction in the total output there was little change in the actual number of the fingerlings and larger sizes of game fish. It is gratifying to note that the production of game and pan species amounted to 151,723,000, an actual as well as proportional increase. These forms comprised 2.5 percent of the total output, but it must be recognized that practically all of the species propagated are sought for recreation at certain times or places.

As maintenance of a continuing stock of food fishes, particularly in coastal waters, contributes to a stable economy, and as maintenance of a well-grounded recreational asset in the form of angling contributes to a sound morale, the Department's fish-cultural functions have made their contribution to the basic elements of national defense.

PROPAGATION OF COMMERCIAL SPECIES

Stormy winter weather prevailing off the New England coast limited the activities of the smaller commercial fishing craft operating in the inshore waters. The spawntakers based at the hatcheries at Gloucester, Mass., and Boothbay Harbor, Maine, were therefore unable to obtain and fertilize the usual quantity of cod and haddock eggs. During the pollock season conditions were more favorable, resulting in an increased rate of salvage for this species. At Woods Hole, Mass., there was difficulty in obtaining an adequate supply of spawning flounders, resulting in approximately 50 percent reduction in the egg collections. Experiments in planting the flounder fry in Narragansett Bay and Long Island Sound were continued, though on a reduced basis.

At Boothbay Harbor, Maine, improved production of fourth-stage lobster fry was attained by heating the water supply for the hatchery. This practice was intensified in handling the lobster hatch during the summer of 1940, and was adopted at the rearing plant maintained by the State Department of Sea and Shore Fisheries.

The aggregate output of fish and eggs from these three stations exceeded six and one-half billion, of which over five and one-half billion comprised fertilized eggs recovered as a salvage measure.

Pacific salmon.—Exhaustive investigation by Bureau biologists, and the report of an independent board of consultants, has indicated that enlarged hatchery operations will constitute one of the most important elements in a plan for maintaining the run of salmon in the Columbia River. There is evidence that the same conclusion may be reached with reference to the Sacramento River in California. The mammoth hatchery developments under construction by the

Bureau of Reclamation in and near Leavenworth, Wash., were not in full operation at the close of the year. It was expected, however, that part of the 1940 run of salmon would be handled at this plant.

The existing salmon hatcheries located on the Rogue River, on Puget Sound, and at Quinault, Wash., as well as on the two rivers mentioned above, produced an aggregate output somewhat less than the previous year. The greatest reduction was with the chinook salmon, the difference being 13,000,000. Fewer chum salmon were propagated. There was a slight increase in the output of silver salmon, with the production of the valuable sockeye species practically unchanged. Nearly one-half million humpback salmon were provided, this being the year for the 2-year cyclic run of this species.

The salmon hatcheries also propagated steelhead trout and were successful in doubling the output of this much-sought game fish. The hatchery at Little White Salmon, Wash., has been in process of reconstruction during the year, and minor improvements, mainly new ponds, were developed at several other points. Hatcheries at Mill Creek and Battle Creek, Calif., were inundated during the floods which visited the Sacramento Valley, but damage to property was negligible and loss of fish was slight.

Anadromous species, Atlantic coast.—For the second successive year the production of shad was increased, totaling 42,000,000 in comparison with 34,000,000 during the previous year. The James and Chickahominy Rivers in Virginia were served by the pondfish station near Roxbury, Va., where previous attempts at shad culture had been largely unsuccessful. Experiments in the rearing of shad fry in ponds were continued, the results indicating that this practice may be a valuable supplement to present methods when suitable ponds are available. Yellow perch and white perch were also propagated at the shad stations on the Potomac River and Albemarle Sound. A production of almost 6,000,000 striped bass fry at the hatchery on the Roanoke River in North Carolina represents the highest level attained with this species in many years.

Of outstanding interest is the resumption of the propagation of Atlantic salmon in Maine. After working out preliminary plans in cooperation with the Maine Department of Inland Fish and Game, the facilities of the East Orland Hatchery were improved. A few thousand salmon eggs were obtained from the Dennys River run in the fall. These were hatched and are being reared to fingerling size before planting. During the spring approximately 100 migrating salmon were taken from the fish ladder at Bangor, Maine, and transferred to a holding pool prepared at the hatchery. Losses of injured fish were slight, and at the close of the year this relatively small stock of brood salmon was in good condition and prospects were favorable

for the collection of several hundred thousand eggs. While the work is of limited magnitude in comparison with the scope of the activity in earlier days, there is every reason to hope that the restoration of the Atlantic salmon is definitely under way.

Commercial species, interior waters.—With the transfer of the Put in Bay (Ohio) Hatchery activities to the control of the State of Ohio, the culture of Great Lakes species is markedly limited. A limited number of lake trout, whitefish, and lake herring eggs were obtained for the Cape Vincent, N. Y., and Duluth, Minn., stations. At the latter point most of the lake trout eggs were supplied by the State of Michigan. The State also supplied lake trout fry which were transferred to the Charlevoix (Mich.) Station, which has been reconditioned as a rearing unit. Losses were heavier than was anticipated, and the fingerlings were released before they had attained the desired growth. However, the effort was repeated during the spring of 1940, and at the close of the fiscal year approximately one-half million lake trout fingerlings were thriving and growing rapidly. It is believed that the planting of lake trout at a larger size will, to a large extent, compensate for smaller numerical output.

The production of pike-perch was only a small fraction of the output of previous years, the reduction being due to the transfer of the hatchery on Lake Erie which has produced the bulk of the eggs of this species. Aside from the Great Lakes species, the commercial fishes of interior waters comprise mainly the carp, buffalofish, and catfish. Since the supply of carp appears to be holding up well, no effort was made by the Bureau to propagate that species during 1940. In the case of buffalofish and catfish there was a significant increase in the plantings of eggs and fish. The buffalofish were planted almost entirely in the Upper Mississippi area.

Game species.—Inasmuch as the game and pan species of interior waters are subject to angling exploitation of increasing intensity, special attention was given to the culture of these species. All varieties of trout were distributed in larger numbers, and in many instances in larger sizes. It has been recognized that smaller local waters, farm ponds, and State and county parks, if well stocked with common panfish, present a recreational asset of great importance to a very large part of the population. Consequently the production of the sunfishes, catfishes, and lesser game fishes has been augmented for the purpose of maintaining a supply of fish in waters which may not be frequented by the more ardent angler. Most of the new hatchery developments have been planned with this object in mind. Certain advances and improvements have been effected in hatchery technique, but the actual stocking of the waters them-

selves remains the principal function in which effectiveness can be increased.

At the close of the year the Bureau assumed responsibility for a trout hatchery and rearing unit constructed by the Forest Service on Warm River, Idaho. The site is considered one of the best in the Western United States. A few Dolly Varden trout were propagated, although its low esteem by the anglers discourages any general attempt to increase its abundance. Efforts of several years duration to establish the smallmouth bass in the Southwest appear to have been crowned with success, although additional time will be required for the species to become abundant. The Bureau has continued to experience a shortage of Loch Leven trout, following the virtual elimination of the egg supply previously obtained from the Madison River in Montana. Substitution of a domesticated brown trout stock has been resorted to as a means of overcoming the deficiency. One of the railway distribution cars was retired from service during the year, since the fleet of distribution trucks has been built up to a point where transportation by highway largely supplants movement by rail.

A new demand for warm-water fish has developed as a result of the program of farm pond construction sponsored by the Soil Conservation Service. Although these requirements and the demands for stocking other waters under direct Federal control have been given priority, the percentage of unfilled applications from private individuals and organizations has remained at a low level.

Shipments of rainbow trout eggs were made to Puerto Rico, Hawaii, and to the Republic of Colombia. A successful hatching season during the winter and spring provided an excellent stock of young fish which were being held for rearing and subsequent distribution at most of the stations at the close of the year.

Upper Mississippi Wildlife and Fish Refuge.—The traditional salvage or rescue of stranded fishes in the overflow areas was virtually terminated. The Bureau's policy of constructing propagating ponds at suitable points within the refuge was fully justified by the production achieved at Genoa, Wis., Guttenberg, Iowa, and several other points. The yield of bass was so great during the summer of 1939 that distribution facilities were taxed to the limit. The 1940 hatch was not as heavy, but the production was of great value in maintaining the supply of fish in the great recreational areas in Minnesota and Wisconsin. In addition to this type of fish-cultural work, the headquarters station at LaCrosse, Wis., also provided a large quantity of trout for the same areas.

DIVISION OF FISHERY INDUSTRIES

The Division of Fishery Industries is concerned with the activities and welfare of the commercial fisheries and fishery industries. Its work includes the planning, supervising, and conducting of: (1) The Fishery Market News Service; (2) fishery statistical surveys; (3) investigations in fishery technology; and (4) investigations in fishery economics and marketing, including the administration of the Fishery Cooperative Marketing Act.

Studies and investigations are planned particularly to promote the more orderly marketing of fish and shellfish, to develop commercial uses for little-known or little-used fishery products, and new uses for the better-known species and commodities, and to improve the technology of capture, manufacture, handling, and marketing. This work tends toward the elimination of waste in marketing, and greater utilization of the fishery harvest. Consequently, it accomplishes an important function in conservation. This is imperative, since obviously haphazard and wasteful marketing and technological practices result in a greater drain on the resource for the same volume entering consumption. Thus, the types of activities conducted are of great value in maintaining the important food and industrial resource represented by fish and other aquatic forms, particularly in view of the possibility of a national emergency.

FISHERY MARKET NEWS SERVICE

Essentially, the fishery market news service constitutes the exchange of market information between the fishermen or producers in the fishing areas, and the middlemen in the terminal markets, with the Bureau of Fisheries acting as the exchange agency; that is, the agency for collecting and disseminating market information. The Market News Service now maintains six field offices from which daily reports are issued. These are located at New York, N. Y.; Boston, Mass.; Chicago, Ill.; Seattle, Wash.; Jacksonville, Fla.; and New Orleans, La. The locations of these field offices have been so carefully chosen that the current data collected and disseminated through them cover some phase of the marketing of about one-half of the 3,000,000,000 pounds of fish and shellfish taken annually for food in the United States and Alaska.

New York City was selected for the first Market News office, since it is the center of this country's most important consuming area and the market to which fishery commodities are shipped from all parts of this Nation and from foreign countries. This market exercises considerable influence over production and prices of fishery products throughout the country.

The choice of Boston for a Market News office was due to its importance as the center of New England's valuable fisheries and as a port of landing for large quantities of fish. Thus, Boston is primarily an office for the reporting of production.

Chicago is probably the most important inland market for fishery products. Much of the harvest of fresh-water fish from the Great Lakes and other interior waters is shipped to this city's wholesale market for distribution. Chicago also receives large quantities of Eastern haddock and rosefish, Western halibut and salmon, Gulf coast shrimp and red snapper, and large quantities of Canadian fresh-water varieties.

Seattle is of importance particularly as a landing port for the halibut fisheries of the Pacific Northwest. It also is of importance as a port of landing for salmon in the fresh and frozen fish trade and for other species common to the Pacific coast.

Jacksonville is of importance as an assembling, distribution, and shipping center through which most of Florida's fish pass when destined for northern markets. Consequently, market information emanating from this office is of greatest value to both northern and southern producers, shippers, and dealers.

New Orleans is the largest centrally located city in the Gulf States, which are important in the production and distribution of many fishery commodities; particularly shrimp. Consequently, this city offers unusual facilities for the collection and dissemination of valuable fishery market news data.

In addition to the coverage of market news in these producing, consuming, or distribution centers, the daily releases from each office are augmented by pertinent data telegraphed to it from the other offices, as well as from market news reporters located at important producing points along the coasts.

During the past year the Market News Service has completed arrangements for the daily broadcasting of market news information from radio stations at Boston, Chicago, Jacksonville, and New Orleans, and is making arrangements for similar broadcasts in other cities. Periodic market news reports also are prepared and disseminated from the Washington office. These include summarized data made available through the daily and monthly reports of the field offices as well as articles relating to the commercial fisheries and other related information.

STATISTICAL INVESTIGATIONS

The collection of fishery statistics was one of the earliest activities of the Bureau of Fisheries, and the supplying of these data has continued to be a major function. Fishery statistics are collected to serve

biological and economic purposes. Since the fisheries are usually prosecuted in areas not under private ownership, the problem of their conservation is of national concern. It therefore is important that the Federal Government keep close watch over the condition of the various fisheries in order that depletion may be anticipated in time that remedial measures can be successfully taken. Thus, current statistical data must be obtained on the yield of our fisheries. These figures furnish the biologist with the background from which he estimates future trends and yields. In addition to their value in the conduct of conservation studies, the Bureau's statistical surveys form the basis for information of greatest importance to guide the fishery trade in the conduct of its business activities.

Sectional surveys.—The basic statistical surveys are those for the various geographical sections. These cover complete statistics of the volume of the catch of fish and its value, employment in fishing, quantity of fishing gear used, number and classification of fishing and transporting craft, employment in wholesale and manufacturing establishments, and the volume and value of manufactured fishery products and byproducts. The first comprehensive survey of this type was made for the year 1880. Surveys following 1880 until recent years were periodic, or covered a limited number of States or areas in any single year. Currently, however, complete statistical surveys of the commercial fisheries in all marine and lake sections are being made. Detailed tabular statements based on the sectional surveys are published annually.

Landings at certain important United States ports.—In addition to the basic sectional surveys, the Bureau also conducts various local or special surveys. These include the daily collection of data on the landings of fishery commodities by fishing vessels at the ports of Boston and Gloucester, Mass.; Portland, Maine; and Seattle, Wash. Statistical data for the New England ports are recorded according to the fishing areas from which the catch is taken and gear used in capture. Consequently, this information is most important in following the trend of the yield of the important North Atlantic species. Data on daily landings at Seattle are of equal importance in following the trend of the fisheries for halibut and other North Pacific forms. Data on these landings of fishery products are published monthly.

Shad and alewife fisheries.—Shad once entered the streams of the Atlantic coast, on their spawning migration, in much greater numbers than they now do. Two of the most important streams of present spawning migrations are the Hudson and Potomac Rivers. Consequently, in order that detailed data may be available for the study of these fisheries, annual surveys are made of the production of shad

in these rivers. Annual surveys are also made of the catch of alewives in the Potomac River.

Canned fishery products and byproducts.—Since 1921 annual surveys have been made to collect statistics on the production of canned fishery products and byproducts of the United States and Alaska. These data are of importance to the industry as a guide in their manufacturing activities. This information is published annually.

Cold-storage holdings of fish.—Through the cooperation of the Agricultural Marketing Service, Department of Agriculture, statistics are collected and published monthly on the cold-storage holdings of fishery products and quantities frozen by important species or groups of species. These figures are shown separately for major geographical sections. Since holdings of fishery commodities in cold storage represent a considerable portion of the available supply of fishery commodities on hand at any one time, these data are eagerly sought by the fishery industry. Monthly cold-storage bulletins are published.

Sponge market, Tarpon Springs, Fla.—The domestic sponge fishery is confined to the State of Florida, and a large part of the production is sold through the Sponge Exchange at Tarpon Springs. In view of the importance of this exchange in the total domestic sales transactions of the industry, the Bureau obtains and publishes statistics of the quantity and value of sponges by variety classifications which are handled through the exchange each year.

TECHNOLOGICAL INVESTIGATIONS

The principal objective of fishery technological investigations is to increase the economic value of the aquatic harvest by more complete and efficient utilization. Toward this end studies are conducted of the technical phases of fish production, processing, and marketing. In planning these studies efforts are made to select those which have the broadest fundamental application. The value of technological investigations does not end with their application to the fishing industry, as other American industries also make extended use of the results of this work. For example, the Bureau pioneered in this country in the development of quick-freezing methods as adaptable to the preservation of fishery products. These methods now have widespread application in the preservation of fruits, vegetables, poultry, and meat. In another instance, a search for new sources of vitamins A and D was conducted and it was found that oils from many species of fish are rich in these vitamins. A direct outgrowth of these investigations is the production of oils having a high vitamin content from the livers and viscera of various species of fish such as halibut, tuna, and swordfish. This work has resulted not only in raising the income of the fish-

ery industries through the sale of products heretofore wasted, but it also has been most valuable to the drug industry. Of outstanding importance, however, is the contribution of this work to the health of our people by providing an economical and convenient source of vitamins A and D.

It should be pointed out that technological work, through studies which promote the greater utilization of domestic aquatic forms and through the development of new uses for these commodities, is making the people of the United States less dependent upon foreign sources, which is vitally important in view of present world conditions.

Specifically, the technological work of the Bureau during the past year has dealt with problems in the preservation of fishery products for food, in the manufacture of fishery byproducts, and in the nutritive value of aquatic products in general.

Preservation of fishery products for food.—Studies on the preservation of fishery products for food are conducted in the fields of chemistry, biology, and engineering. Their purpose is the improvement of the quality of fishery food products; the development of scientific tests for judging the quality of fishery products; the development of methods for further improving sanitary conditions in fish-packing plants; and the development of additional fresh, frozen, cured, and canned fish foods. During the past year there were many requests for research on problems of this type. This is indicative of the desire of the fishery industry to place on the market food products which will meet the most exacting requirements as to quality and wholesomeness, and to make the most effective use of the fishery harvest. Not only has the fishery industry been instrumental in having these studies conducted, but it has been quick to adapt to commercial practice many of the recommendations resulting from this work.

Manufacture of fishery byproducts.—Investigations in the manufacture of fishery byproducts have been particularly concentrated on the economic utilization of salmon cannery trimmings and fish livers and visceral organs; the preparation of fish meals of improved nutritive value; the problems of the storage of fish meal; oxidation of fat in fish meal; and the solubility of fish proteins.

Nutritive value of aquatic products.—Studies on the nutritive value of aquatic products have always occupied an important place in the fishery technological investigations because the food value of a product ready for marketing is, in most instances, the true yardstick or measure of the value of a new method of processing or an improvement in existing methods in the industry. For example, assuming that costs of processing are equal in each case, if a new method of manufacturing fish meal or a new method of freezing fish fillets pro-

duces a finished product of better quality, measured in terms of food value, then that is a true estimate of its worth or justification for its commercial application.

The problems undertaken in this field during the past year have been concentrated on determination of the nutritive value of the edible portion of fishery products, more particularly the biological value of the protein. Considerable effort has also been expended on evaluation of the feeding value of fish meals and a study of changes resulting from conditions of processing and storage.

Study was also made of the biological value of the protein of salmon taken under different physiological periods such as prior to migration, during migration, and, finally, spawning. Acute and chronic toxicity tests with certain kelp products, Irish moss, and agar, have also been carried out.

ECONOMIC AND MARKETING INVESTIGATIONS

There was a constant demand throughout the year for economic studies of the various phases of the commercial fisheries and the marketing of fishery commodities. The limited facilities of the Bureau make it possible to conduct only a very limited number of large-scale studies of these types. During the past year, however, a rather extensive survey of the retailing of fresh and frozen fish was made. Data thus far reviewed show that the volume of sales for fish was small for most of the stores surveyed. The sales of nearly 40 percent of the 4,000 retail stores handling fish, which were included in the survey, averaged less than \$100 per week during 1938. For about 30 percent of the stores, sales of fish averaged between \$10 and \$29 per week and less than 30 percent reported fish sales in excess of \$29 per week. The 4,000 stores handling fresh fish were located in both commercial and residential sections of about 50 representative cities in the eastern section of the United States. Included among these stores were nearly 1,200 chain stores, over 2,000 independent stores and voluntary chain stores, and about 400 fish markets. Preliminary results of the study indicate that very few stores have extensive facilities devoted to fish sales. Frequently fish are handled on only two or three days of each week, and on these days fish are allocated a small part of the space usually occupied by meats. A large percentage of the stores reported that the fish business is profitable, and some operators indicated that fish was the most profitable item handled. However, many owners and managers of stores evidenced little interest in fish sales and consequently devoted little effort to promote this phase of their business.

It is expected that a great deal of information valuable to retail fish dealers and allied interests will become available upon the completion of the tabulation and analysis of the large volume of data collected in the course of this survey.

Work in connection with the administration of the Fisheries Cooperative Marketing Act was continued during the year. Such work particularly took the form of collecting, analyzing, and disseminating information. This unit of the Bureau offers an advisory service to fishermen who are considering the desirability of forming cooperatives.

Other studies relating to the economics of the fisheries or the marketing of fishery commodities conducted during the year included investigations of the surplus-fish situation; a compilation of the magnitude of the commercial fisheries of the world; the assembling of data on the commercial fisheries as a source of employment; a study of the significance of byproducts to the fishery industries; a review of the rosefish fishery of New England; and studies of such specific fisheries or industries as the Chesapeake Bay soft-crab industry, the shark fishery of the South Atlantic coast, and the Pacific coast oyster industry.

BIOLOGICAL FISHERY INVESTIGATIONS

The primary purpose of all biological fishery investigations is to insure a continuing supply of fish and shellfish for food and industrial purposes. The measurement of the drain on existing resources, the determination of withdrawals that may be made without endangering future supplies, and the development of devices or procedures to protect undersized fish from wasteful and destructive methods of fishing are of fundamental importance from the standpoint of conserving an important food resource. In time of war or threatened war increased exploitation of the fisheries is inevitable. The progress of fishery biology since the first World War will prevent a repetition of many of the serious mistakes made during that period, when certain fishery resources were reduced to dangerous levels by uncontrolled exploitation. It is essential, however, that the programs of investigation that are now in progress, and that are providing information essential to proper fishery management, should be continued without interruption through any period of national emergency if our aquatic resources are to be safeguarded.

North Atlantic fishery investigations.—Biological fishery investigations in North Atlantic waters are concerned primarily with determining the size of available stocks of fish, measuring fluctuations

in abundance of these stocks from year to year, and discovering how large a catch may be made each year without impairing the future productiveness of the stock. For approximately 10 years such a study has been under way for the haddock, which supplies a larger yield than any other New England food fish. It has been demonstrated that in the Georges Bank area, which accounts for the major part of the catch, fluctuations in the abundance of commercial-sized haddock follow regular cycles, which are related to similar cycles in the number of young that survive to commercial size. When years of intensive exploitation of the stock happen to coincide with years of poor survival of the young, a sharp decline in haddock abundance may be expected. Extensive data collected and analyzed by the staff have provided an index of the size of the haddock stocks on Georges Bank for the period from 1914 to 1937. Because of changes in the size and composition of the fleet and the adoption of new gear which in itself increased the effectiveness of fishing operations by at least 29 percent, the catch records alone are no indication of the abundance of haddock, but must be subjected to elaborate statistical analysis before the size of the available stocks may be ascertained.

Mackerel landings on the Atlantic coast in 1939 were considerably smaller than in 1938, although the early months of the 1940 season were marked by a slight upward trend. There has been, moreover, a steady decline in the number of purse-seine vessels engaged in mackerel fishing, with the 1940 fleet the smallest in many years. Investigation of the mackerel fishery has brought to light many significant facts related to the distribution, spawning habits, growth rate, and migrations of the species. While progress has also been made toward determining measures of abundance and predicting changes in the availability and abundance of the mackerel, final solution of these problems awaits offshore investigations from the newly acquired fishery research vessel *Albatross III*.

The various species of groundfish, including the haddock, cod, pollock, rosefish, cusk, hake, and several species of flounders, form the basis of the most important New England fisheries. Fluctuations in the total yield of these fishes have been noticed in past years, but until a biological study of groundfish was begun in 1938 the causes and extent of these fluctuations were unknown. Indices of abundance are now being constructed for each species. When these indices are completed and the requisite knowledge of the life history becomes available for each species, it will be possible to suggest means of maintaining the population at that level which will yield the largest sustained annual catch.

The lobster is of paramount importance to the shore fisheries of the North Atlantic States, since it furnishes a large part of the income of great numbers of small-boat fishermen from Maine to New Jersey. The decline of the lobster catch to approximately one-third of its former level, in spite of vast increases in the amount of gear fished, led to a cooperative investigation by the Bureau of Fisheries and the State of Maine. The primary purposes of this study are to develop improved methods of lobster rearing and to determine the proper legal-size limit. Measurement of lobsters caught commercially along the Maine coast indicates that only about eight percent of the lobster population has an opportunity to spawn, suggesting that present size limits result in both an economic and biological waste. Further research on this problem is in progress.

The past year witnessed increased interest in the restoration of Atlantic salmon. In cooperation with representatives of Maine and other North Atlantic States, a cooperative program designed to restore and maintain salmon runs in favorable New England streams has been prepared. It is hoped that unified support will be accorded this program so that it may be put into effect in the near future.

Middle and South Atlantic fishery investigations.—Additional study of the Atlantic coast shad fishery provided confirmation of the opinion expressed a year ago—that the principal cause of depletion is overfishing rather than pollution or obstruction of runs, and that recovery can best be brought about by providing a spawning escapement in such depleted areas as the Chesapeake Bay and the waters of North Carolina which will be substantially equivalent to that which has proved adequate in the Hudson River. Investigations in 1939 also demonstrated the important fact that the moderate fishing rate in the Hudson eventually takes as many shad from each year-class as the more intensive fishery in the Chesapeake, but by spreading the catch over several years allows six times as much spawning from each year-class. Recommendations have been made to the conservation departments of Maryland, Virginia, and North Carolina to the effect that the fishery should be reduced to 60 percent of its present magnitude by restricting the amount of gear licensed.

As a means of securing greater yields and larger profits from each brood of striped bass, regardless of its relative abundance, the Bureau of Fisheries recommended the establishment of a minimum-size limit of 16 inches, measured from the snout to the fork of the tail. This recommendation was adopted by New York during 1939. A slightly higher size limit is in effect in New Jersey. Recommendations for substantial increases in the size limit have been submitted to the fishermen by the Virginia Commission of Fisheries and similar action

is expected in Maryland and North Carolina. A survey of Chesapeake Bay and the coastal regions from Virginia to southern New England showed that important striped bass spawning grounds are confined to the Maryland waters of the Chesapeake and Delaware Bays, and the lower Hudson River. According to previous surveys the lower Chesapeake Bay and the sounds and coastal rivers of North Carolina are also productive areas. These observations suggest that fishing for striped bass along the coasts of New Jersey, Long Island, and southern New England is maintained chiefly by migration of fish spawned in other areas. Investigations during the year provided further support for the view that production and survival of striped bass are to a large extent independent of the number of spawners; hence regulatory measures to increase the spawning stock are not of primary importance in the conservation of this species.

Long Island cooperative investigation.—Public interest aroused by the cooperative study in which the Bureau of Fisheries participated with the New York Conservation Department, as reported last year, caused the Boards of Supervisors of Suffolk County, and later of Nassau County, Long Island, to contribute funds for a similar cooperative study of local fishery problems. The investigation of the Suffolk County fisheries has been under way throughout the fiscal year 1940; that of Nassau County fisheries since May 20, 1940.

It has been learned that the flounder populations in different regions of Suffolk County are independent, so that measures to improve fishing conditions can be applied directly to individual areas. With the cooperation of pound-net fishermen, methods have been worked out for releasing a large percentage of small sizes of several species of fish taken in nets, thus permitting these young fish to reach a size at which they will be of greater value to commercial fishermen and anglers. The survey has disclosed also that the sport fisheries account for a considerable percentage of the total catch of several important species.

Shrimp investigations.—Because of the constantly increasing drain on the supply of shrimp, which is the most valuable fishery product south of Virginia, it has long been considered important to know whether or not there is a reserve supply available beyond the range of the present commercial fishery. This question has now been answered in the negative through the offshore explorations of the vessel *Pelican* in the Gulf of Mexico and along the South Atlantic coast from Fort Pierce, Fla., to Cape Hatteras, N. C. No concentrations of shrimp were found in either area outside the waters now being exploited, a fact which emphasizes the importance of measures recommended for the protection of the supply in inshore waters.

Tagging of shrimp in the Gulf of Mexico during the past year established the fact that here, as on the South Atlantic coast, the shrimp

move from the waters of one State to those of another, so that effective conservation of the supply must be accomplished by unified action of the States concerned. Clear evidence of interstate migration was obtained in waters east of the Mississippi.

Surveys on the South Atlantic coast during the spring months of 1940 revealed a critical condition which threatened the production of a crop for next year's fishery. The number of spawners had been reduced to a dangerously low level through the operation of two factors: The excessive winter fishery in Georgia and Florida which draws upon virtually the entire South Atlantic population of large, migratory shrimp, and the unusually cold winter which killed large numbers of the small shrimp which do not migrate but remain in coastal waters as far north as North Carolina. Because of this drastic reduction of the stock, the cessation of all fishing until July 1 was recommended in order that the remaining shrimp might have an opportunity to spawn.

North Pacific and Alaska fishery investigations.—For the second consecutive year the activities of the Columbia River staff have been concentrated upon the problem of salvaging the portion of the salmon run which is barred from its accustomed spawning grounds by the erection of the Grand Coulee Dam. Salmon, steelhead trout, and other fishes bound for the upper Columbia River are being trapped as they pass through the fish ladders at Rock Island Dam, 150 miles downstream, and transferred to tributaries of the Middle Columbia where suitable conditions exist and where it is desired to build up the runs. Because the chinook and blueback salmon have a strong instinct to return to the streams in which they have spent the early months of life, it is expected that such trapping operations will be necessary only throughout one complete cycle of salmon runs. During the period from May 1 to December 9, 1939, 41,722 fish were hauled, of which 36,224 were salmon and steelhead trout. The loss of fish during trapping and hauling was extremely small and observations later in the season revealed successful spawning.

In the Puget Sound area, where the coho salmon are important both from the standpoint of food and recreation, returns of these fish from marking experiments conducted in previous years indicate that releasing fingerlings in the fall produces slightly larger returns and is less expensive than releasing them in midwinter, and is greatly to be preferred to releasing them in the spring of their second year.

Observations on the salmon populations of Bristol Bay, for the purpose of collecting data on which to base a program of management for this valuable resource, were made in 1939 for the second consecutive season. The study of the life histories of the races of salmon populating the lakes and rivers in a watershed of over

35,000 square miles consisted of regular samples of seaward migrant fingerlings taken at five points selected for the purpose. Fingerlings were marked for future identification and released wherever they were available in sufficient numbers, and scale samples, body measurements, weights, and information on sex proportions were obtained from each of the principal rivers during the commercial fishing season. Investigations at sea included experimental fishing and tagging to determine the feeding grounds and migratory routes followed by the adult salmon as they make their way in to the rivers to spawn.

Investigation of the decline in productivity of the Karluk River watershed has revealed that, while the mortality of salmon during the period of life in the sea is remarkably constant, great variations in the percentage of mortality in fresh water are to be expected. These variations are related to changing environmental conditions and to cycles in the fertility of the lake and the abundance of food organisms. A report on the phases of this investigation that are now completed has been prepared for publication.

The existence in the Karluk system of at least two separate populations of the Dolly Varden trout, which prey to some extent on red salmon, has been demonstrated by tagging. Since one of the populations is resident within the lake and the other migrates annually to and from the ocean, control measures, if found necessary, would differ for the two groups.

Improved facilities have now been provided for the study of the pink salmon, which is by far the most abundant species of salmon in Alaska and hence an important source of food. Because of the short life cycle of this species (2 years) it is possible to build up or decimate a population of pink salmon within a short time, hence the need for continued watchfulness. A combination dam and counting weir is now in operation at Little Port Walter, making possible observations that will be used to compute the percentage of mortality in both fresh and salt water. A permanent biological field station has also been established so that biological observations on the survival of the broods may be made throughout the year, permitting more accurate predictions as to the size of the annual runs.

Throughout the year the collection, tabulation, and analysis of the daily catch records of the various types of fishing gear operated by the salmon fishery of Alaska were continued, contributing to an invaluable permanent record of the fishery throughout the Territory. Indices of abundance derived from these data are an important basis for recommendations for changes in the fishing regulations.

The collection of statistical and biological data on the Alaska herring fishery has been continued with a view to safeguarding the supply,

which is now utilized principally in the preparation of oils and meals. Although large catches have been made in certain areas, several facts suggest the need of closer supervision of the fishery. Among these are the lack, in the Kodiak area, of any appreciable increments to the stock as a result of spawning in recent years, added to increased fishing intensity and the observed decline in return per unit of gear. Large catches have been made also in Prince William Sound, but here again the yield is being maintained only by increasing the fishing effort. The catch in southeastern Alaska in 1939 was the lowest since the inception of the intensive reduction fishery 15 years ago. This decline is the result of excessive exploitation combined with the failure of several spawning seasons. In an effort to rebuild the stock, fishing in the Cape Ommaney area was prohibited during the 1939 season, and all fishing for reduction purposes was prohibited in southeastern Alaska during 1940.

Pacific pilchard investigations.—The object of investigating the pilchard fishery of California, Oregon, and Washington is to determine how large a catch may be made annually without jeopardizing future yields. Recognition of an irreversible decline is made difficult by the existence of natural fluctuations in abundance and variations in the availability of the fish to the vessels. For these reasons evidence on many aspects of the fishery and on the biology of the pilchard populations is necessary and is being collected.

Accurate means of determining the age of pilchards has heretofore been lacking, a fact which has hindered the determination of the contributions made by the various spawning seasons to the commercial stock. Intensive experiments conducted by the staff during the past two years have now disclosed a method of defining and interpreting age marks on the scales of juvenile pilchards through the third year of life, and probably of older fish as well, thus providing an indispensable tool of pilchard research.

Surveys to determine what oceanographic conditions control the survival of young pilchards and to discover the extent of spawning areas and the amount of spawning were carried out with the cooperation of the Scripps Institution of Oceanography during the 1939 and 1940 seasons. During the 1940 survey, pilchard eggs were found over the entire area of 1,800 square miles covered by the survey—from San Diego to about Point Conception—although the maximum spawning seemed to have occurred in a zone parallel to the coast and lying 50 to 100 miles offshore. The location of the spawning area appears to correspond to certain hydrographic features. Data collected will permit computation of the total number of eggs in the area explored and an estimate of the size of the spawning stock. Repeated and extensive surveys of this sort are necessary to determine whether the spawn-

ing stock is being maintained at a sufficiently high level to provide adequate replacement for the toll taken by a large and intensive fishery.

While no final conclusions as to the status of the pilchard stock can as yet be drawn, certain facts are evident. During the 1937-38 season, for the first time, the supply failed to equal the demand. During this season also the relatively low catch was accompanied by a decrease in the proportion of large fish in the catch. Without further information these facts do not constitute conclusive evidence of depletion but nevertheless suggest that the pilchard industry has reached the point where further expansion can result only in a rise of production cost.

Great Lakes fishery investigations.—Members of the staff continued their active cooperation with State and Federal officials and with sport and commercial fishermen, participating in meetings and conferences in which Great Lakes fishery problems were under consideration and assisting State conservation officials in the drafting of fishery regulations. One of the significant events of the year was the revision of the commercial fishery regulations for the State of Wisconsin waters of Lake Michigan, which, although at present the subject of litigation instituted by certain fishermen, constitutes another important step toward the attainment of uniform regulations for all waters of that State. An event of even more widespread interest and significance was the appointment, on February 29, 1940, of an International Board of Inquiry for the Great Lakes Fisheries. The Board will undertake a study of the fisheries and will submit recommendations as to means of conserving and developing the fishery resources, possibly by international agreement.

Detailed information on fluctuations in the production and abundance of important commercial species and on the intensity of the fisheries of Lake Michigan has now been compiled for a 10-year period. These data have revealed, among other facts, a pronounced decline in the production and abundance of whitefish in Lake Huron in 1938, in which year the abundance index of this fish was only 29 percent of the 1929-34 average. Although recommendations had been made by the Bureau for the control of the deep trap-net fishery for whitefish, no effective measures were adopted until the fishery had sustained damages that possibly are irreparable.

Much of the attention of the staff was given to analyzing data previously collected and to preparing reports on investigations that are now completed. Among these was a report on the fishery resources of the Red Lakes, which constitute one of the principal sources of livelihood for the Red Lake Indians. No positive evidence of a decline in abundance was found. Recommendations were offered for the proper management of these fisheries, based in part upon studies of

the growth rates of the various species which indicate the minimum size at which it is desirable to subject these fish to commercial exploitation. Another study which has now yielded useful information is an extensive tagging project carried out in cooperation with a commercial fishing firm of Port Washington, Wis. Of the 2,902 Lake Michigan fish that were tagged and released, 38 percent were recaptured, the results disclosing important information on the extent of migration and the intensity of fishing operations. A study of the age and growth of the yellow perch of Saginaw Bay indicates that the present legal length of 8½ inches possibly is too low, inasmuch as yellow perch of both sexes attain this length just as they are entering on the period of most rapid increase in weight.

Shellfish investigations.—Research on oysters was conducted during the year, in accordance with the established policy of the Bureau, (1) to increase technical knowledge of the methods of propagating oysters under various conditions in the coastal waters; (2) to find practical means of improving the quality of marketable oysters; (3) to improve methods of protecting oysters against various pests and parasites; and (4) to determine the effects of pollution and devise means of rendering certain trade wastes harmless to oysters.

Studies of the factors controlling the spawning of oysters have revealed that the old concept of a single critical temperature that induces spawning in oysters is no longer tenable. Depending on the physiological state of ripeness which may be influenced by proper chemical stimulation, the oyster may spawn at various temperatures ranging from 63° to 95° F. These physiological studies have provided a key to a practical method of controlling the spawning of oysters under natural conditions.

In compliance with the request of local oystermen, the Bureau's Milford (Conn.) Station has continued its custom of issuing weekly bulletins on the physiological condition of the oysters in Long Island Sound and the expected time of setting. To this information there have now been added reports on the distribution and abundance of starfish, the principal oyster enemy in this region.

Experiments in North Carolina demonstrated the value and practicability of growing oysters in improved marsh ponds and canals where the depth and velocity of the currents can be controlled. In such areas it is possible to prevent the "smothering" of seed obtained from the early summer spawning by the spat of the September spawning. Even from poor quality seed a growth in volume of over 300 percent was obtained during the first year. By holding seed in special trays it was found possible to cultivate oysters at concentrations equivalent to over 2,000 bushels per acre. These experiments are being continued and developed on a small commercial scale to

determine the maximum size and age obtainable by oysters in these waters and the percentage of mortality to be expected according to age and environmental conditions.

Operation of an experimental oyster farm in South Carolina is providing considerable information on the relative value of the various types of bottom for seed-oyster production. On the Gulf coast, where oyster production has been at a low level for a number of years, the staff is cooperating with oystermen and with State conservation departments in formulating programs for the development and maintenance of natural oyster grounds and for the creation of new grounds by planting shells and seed oysters.

Methods of controlling starfish were tested under a variety of field and laboratory conditions by the staff and are being put into practice by many New England and Long Island oyster growers in a vigorous effort to diminish the losses caused by this abundant animal. Oyster drills, which are a serious menace to oysters in the Middle Atlantic States and are now becoming more numerous in Long Island Sound, have been found capable, when only 1 month old, of destroying approximately five oyster spat a day. Because of the heavy depredations of the boring clam, another oyster enemy found in Gulf coast waters, an investigation of the life history of this little-known mollusk has been undertaken at the Pensacola (Fla.) Station.

The study of the effects of pulp-mill pollution on the oysters of the York River, Va., has been completed and a final report on this investigation will be made early in the fiscal year 1941.

Sponge investigations.—During the summer of 1939 samples of diseased sponges were received from Florida and subjected to microscopical examination. All were found to be infected with the fungus organism that had been discovered and tentatively identified during the preceding year by one of the Bureau's biologists in surveys of the Bahama Island waters and the Florida Keys. From Key West, where the disease first manifested itself in the United States, it spread to Tarpon Springs, and by the end of December mortality of commercial sponges had proceeded to such a point that fishing was discontinued on bars situated below eight fathoms. At the end of the calendar year 1939 the number of sponges brought to the Tarpon Springs Sponge Exchange had noticeably diminished, causing considerable concern for the future of this resource. During the spring of 1940 there was evidence that the disease had abated and that a large crop of small sponges was in evidence. However, two or three years may be required for a substantial restoration of the commercial-sized supply.

Aquicultural investigations.—Studies concerned with the management of fresh-water sport fisheries are conducted along three prin-

cipal lines. The first is related to the artificial propagation and rearing of game fishes; the second to the problem of controlling the parasites and diseases of fish which frequently curtail the output of hatcheries; and the third to field problems relating to fish management, such as the comparative survival and growth of hatchery and wild trout under natural conditions, the ecological requirements of different species of game and food fishes, and the possibility of increasing fish production in natural waters.

In connection with studies of the artificial propagation and rearing of trout, progress has been made toward developing economical diets without sacrifice of growth. Other experiments have demonstrated that overfeeding of trout brood stock is distinctly detrimental in that it reduces the number of eggs that hatch, while experiments in selective breeding have more than doubled both the rate of growth and the production of eggs.

Studies of the pond culture of largemouth black bass were carried on in Florida with a view to determining the role of fertilizers and forage fish as they affect the production of bass fingerlings per acre. Similar work on a somewhat smaller scale has been conducted in West Virginia. Here, also, field studies of the spawning and survival of smallmouth black bass are being made in selected tributaries of the Potomac River.

The most important result of the studies in fish pathology during the year was the development of a safe, practical, and economical method of controlling the external parasites of fish. Other investigations contributed to an understanding of the causes and prevention of the Western type of gill disease and of the importance of several parasites of trout and bass. In addition to the hatchery studies, losses among wild fish in the field were investigated by the staff. The most important problem of this nature that is currently under study concerns the attacks of fungus organisms which inflicted considerable losses on adult chinook salmon and steelhead trout liberated in the Entiat River in connection with the Columbia River salvage operations.

Fish-management studies on trout waters were carried on at the Pittsford (Vt.) and Leetown (W. Va.) Stations, in the Pisgah Game Preserve in North Carolina, and in Utah, Idaho, and California. One of the surprising results of the "test water" studies conducted in Vermont is the finding that fishing is maintained chiefly by natural reproduction of wild fish, and that stocking with hatchery trout has had little effect. Under conditions obtaining in those waters, stocking with legal-sized fish in the fall has been found to be wasteful, and tests are being made to discover whether stocking with smaller fish will yield better results. In the Pisgah Game Preserve, where the

Forest Service has complete control over all streams, management programs worked out by the Bureau of Fisheries have been in operation. Good results were already apparent in 1939, and during this and the 1940 season it was possible to accommodate more anglers and to permit a longer open season than in previous years. Management studies in the intermountain region have been concerned chiefly with the fisheries problems of Fish Lake, Utah, and of Bear Lake, which is situated almost equally in Utah and Idaho. In California, while experiments on the survival of hatchery trout after planting are still under way, the attention of the staff has been given principally to the problem of devising a plan for salvaging salmon whose migration will be blocked by the Shasta Dam. This dam will be approximately 560 feet high and will cut off all salmon spawning areas above it in the Sacramento, Pit, and McCloud Rivers and their tributaries. The value of these salmon runs has been calculated at \$95,000 annually in returns to commercial fishermen. After surveys of potential spawning areas below the dam and of possible sites for trapping the runs for transfer to such areas, a preliminary report embodying recommendations for the salvage operations was issued in June 1940.

Water quality investigations.—One of the major activities of the aquatic physiologists during the past year was a study of the effects of various components of larvacides and herbicides on fresh-water fishes and their associated aquatic food organisms. These studies have now provided evidence that in waters treated with even small quantities of arsenicals and several other materials commonly used as mosquito larvacides, there is impairment of the growth and nutrition of fishes.

Application of physiological, biochemical, and metabolic methods to the study of fishes from irrigation waters has demonstrated that the physiological condition and reproductive capacity of such fish is often below par, a condition traceable to the concentrations of mineral salts discovered in many return irrigation waters. The same methods of study applied to fishes from waters polluted with mine wastes revealed that chronic injuries result from much higher dilutions of the wastes than heretofore have been recognized.

During the summer of 1939 intensive studies of stream pollution were made along the Atlantic seaboard and throughout the greater part of western United States, resulting in the collection of much new information on the nature and effects of polluted waters.

Studies of impounded waters were continued at Elephant Butte Reservoir in cooperation with the Reclamation Service and the National Research Council, and at Lake Mead in cooperation with the same agencies and the National Park Service.

Protection of fish runs from engineering developments.—The establishment, early in the year, of a section on hydraulics within the Division of Scientific Inquiry provided for the application of biological and engineering skill to fishery problems created by the construction of dams, reservoirs, and diversions for the purposes of power, irrigation, navigation, and flood control.

The work of the Hydraulics Section during the first year of its existence has been devoted to three general phases of fish protection: (1) Supervision of the construction of four large fish screens in Federal irrigation canals and the operation of Federal screens already constructed; (2) consultative services in connection with fish-salvage problems at the Shasta Project on the Sacramento River; and (3) the review of Federal water projects from the standpoint of fish protection. Advice in connection with fishway and screen problems has also been furnished the conservation agencies of several States.

APPROPRIATIONS

Appropriations for the Bureau for the fiscal year aggregated \$2,259,400, as follows:

Salaries, Bureau of Fisheries.....	\$183, 000
Propagation of food fishes.....	949, 400
Construction of fish screens.....	10, 000
Maintenance of vessels.....	214, 000
Inquiry respecting food fishes.....	322, 000
Fishery laboratory, Little Port Walter, Alaska.....	7, 500
Fishery industries.....	80, 000
Fishery market news service.....	76, 000
Alaska fisheries service.....	268, 200
Enforcement of Black Bass and Whaling Treaty Acts.....	17, 000
Mississippi Wild Life and Fish Refuge.....	17, 000
Library.....	600
Travel expense.....	114, 700
Total.....	2, 259, 400

GRAZING SERVICE

R. H. Rutledge, *Director*

World events during the past year brought to American citizens a deeper realization of the significances of range conservation to our national welfare. The vital importance of a continuous, adequate supply of food and clothing to meet the needs of citizens under possibly extraordinary conditions was recognized. Protection and wise use of the source of these products took on a new and realistic meaning in our national planning. Conservation of the Federal grazing lands from which is derived a large part of the meat, wool, and leather essential to our continued well-being was accepted as an important and integral part of our national-defense program.

The Grazing Service exerted an important influence on western land use planning during the fiscal year just closed. Considering the importance of all land resources to a permanent program of national preparedness and economic welfare, the program was given added significance.

As custodian of 142,000,000 acres of public lands in 10 Western States, this Service directed its program toward the main objectives necessary to bring about coordinated use and planning for resource conservation. Not only was this effort directed to the public lands but also to correlating that use with 125,000,000 additional acres of State, county, and private lands intermingled with the public lands. Planning included management collectively with all related agencies, groups, associations, and individuals in an effort to harmonize this use in the greatest public interest.

Industrial and military forces of the national program must be adequately clothed and fed. In this connection the stockmen of the west realizing that they have a dual responsibility looked to the Grazing Service for guidance. Working together with stockmen, farmers, sportsmen, agencies, industries, and groups the Grazing Service has taken the position that something deeper than the grazing of livestock underlies the whole job of public-land administration.



GRAZING CONSERVATION AIDS DEFENSE.

Better forage and more water for livestock on 142,000,000 acres of Federal range is the constant aim of the Grazing Service. Upper: Meat and hides for the Nation are furnished by cattle in operations like this typical scene from the western range country. Lower: Wool for some uniforms in the future is grown on the hoof in grazing districts supervised under the conservation program of the Department of the Interior.

There is a united feeling throughout the organization that in performing the leadership in a great cooperative undertaking it is doing more than merely promoting governmental stewardship of national resources. Its policies and program must take into consideration the welfare of producers and consumers alike. The program is at once a crusade for better things and a defense of the land—one of America's greatest heritages. The best results in any undertaking are obtained by voluntary, spontaneous cooperation of a free people. Continuing that principle there was placed additional emphasis on the value of submitting important questions to the people for consideration. With that principle firmly established in the Grazing Service its activities during the year were directed mainly to planning and leadership in land use as it concerns both the users and the resources. Through this means there has been incorporated into the program active participation by more than 20,000 stockmen and numerous other citizens whose economic and social well-being depends on continued wise production of livestock and its products.

Thus, in facilitating this production and to aid in its mobilization to centers of consumption, processing plants and shipping points the Grazing Service is an important civilian arm of defense.

Peacetime efforts must be aligned adequately with war-time possibilities. That policy must have considerable flexibility. But the major objective—national defense—must never be compromised. In the light of these facts the Grazing Service has reexamined its program in terms of national preparedness and national defense. Out of that reexamination there appeared the question—How can this program be geared to meet the national program of preparedness?

Immediate preparedness efforts are focused on guns, planes, tanks, ships, and men. Back of these items are the immediate and longtime needs for essential raw materials. Meat, wool, mohair, and leather loom large in the picture. The range conservation program places the livestock industry in much better position than ever before to meet present and future emergencies. Production can be kept on a stabilized and continuing basis without repeating the mistakes of range abuse made during the first World War.

With the help of 20,000 users and 555 district advisers the range program can be kept at a high productive level without injury to resources involved.

Should the need arise, equipment such as trucks and tractors manned by skilled operators can be utilized locally for noncombatant purposes.

Maps and radio communication can be made useful for intelligence purposes, for example:

Western range areas already mapped include sites for Army maneuvers, border patrol, bombing ranges, and air navigation bases. Such maps also show culture such as roads and towns as well as important topographic features. Assembled on a large usable scale, these maps are available at field drafting offices located at Reno, Nev., Albuquerque, N. Mex., and Salt Lake City, Utah.

Roads are peacetime investments that will pay wartime dividends. The Grazing Service has developed over 6,000 miles of minor roads and truck trails, feeders between outlying areas and main highways. Experience in road building and maintenance, together with equipment and manpower can be marshalled and put to immediate non-combatant use if necessary. In the case of emergency, Grazing Service personnel is available for patrol duty to guard roads, structures, bridges, reservoirs, and water supplies until the military organization takes over.

One hundred ten C. C. C. camps containing all necessary facilities for 200 men each are distributed in the 53 grazing districts. Eighty-nine of these camps are now occupied and the remainder are being held for future occupancy. Should the need arise these portable buildings can be converted readily into Army barracks. The equipment now available plus manpower to operate and maintain it includes 237 dump body trucks, 1,058 stake body trucks, 159 tractors, 111 graders, 115 rotary scrapers, 50 portable compressors, 83 road rippers, 38 concrete mixers, and 24 well-drilling rigs.

Within the boundaries of grazing districts are many known undeveloped mineral deposits and a number of mines producing vanadium, antimony, molybdenum, manganese, and other ores essential to the defense program. Ready access to such deposits may be necessary in the near future and men will be needed to assist in their development. In the Grazing Service camps are foremen with experience as mine managers, mine engineering, and hard-rock mining. The Service is prepared to open truck trails to mining properties, build temporary roads to aid the production of war-essential minerals, and actually produce and haul ore.

GROWTH OF THE GRAZING SERVICE

Six years ago, on a hot July day, about 800 people crowded into a hotel auditorium in Salt Lake City, Utah, to hear for the first time facts concerning the Taylor Grazing Act of June 28, 1934.

On the platform was a group of Interior Department officials, headed by Assistant Secretary of the Interior Oscar L. Chapman.

These men had come to explain the objectives of the new public land law and to obtain from the people suggestions for its operation.

The auditorium was filled with people who represented the true cross-section of the West. These people were eager to learn; anxious to participate; and deeply concerned as to how the grazing law was to affect farmers, stockmen, and the range itself.

How will the Taylor Grazing Act work on the ground? was the paramount question in the minds of citizens in the West. Likewise this question was paramount in the minds of Department officials.

The setting for this historical meeting was both dramatic and significant. The entire West was in the midst of a great drought, one of the worst of record. Many water holes had dried up, water storage in reservoirs was low, fields were parched, crops were failing and many livestock were dying of starvation.

Western stockmen had made repeated attempts to obtain legislation for the control of grazing on the public domain. They had a big stake in whatever program was adopted. Their discussions were straightforward, sometimes heated but uniformly centered around practical problems in the range country.

For example, Nevada people wanted to know how the act would affect important water policies in that State. Cattlemen from Colorado wanted to know how they would be protected against existing migratory range practices. Utah people asked if they would obtain protection against overcrowding of winter ranges. New Mexico people wanted to know if established stockmen in that State would be disturbed by range redistribution policies. The homesteader wanted to know if this act would establish him in the livestock business. Sportsmen and wildlife interests inquired about the welfare of game. These and hundreds of related questions focused many problems for discussion and consideration.

Out of that meeting was developed a plan for cooperation between stockmen and the administration, which has characterized the pattern of range conservation throughout the 53 grazing districts of the 10 Western States.

Six years have witnessed a steady advance toward the ultimate goal of the Taylor Grazing Act, namely, preservation and orderly use of the natural resources and stabilization of the livestock industry dependent upon the public lands. Such advance is due largely to local participation through "home rule on the range." The appointment by the Secretary of the Interior of advisory boards of stockmen in all grazing districts took the problems right out on the ground for solution. This democratic approach to cooperation and understanding proved successful both from the standpoint of

the administration and that of the stockman. Accordingly, under the sponsorship of the range users themselves "home rule on the range" was written into the law itself during the early part of the fiscal year when Congress made the advisory board system a permanent feature of grazing administration "in order that the Secretary of the Interior may have the benefit of the fullest information and advice concerning physical, economic, and other local conditions in the several grazing districts."

ORGANIZATION

In August 1939 the Secretary of the Interior changed the name, "Division of Grazing," to "Grazing Service."

The Grazing Service is exactly what the name implies—a service agency on range matters. It manages the public lands chiefly valuable for grazing and correlates the use thereof with that of related properties, both State and private, for the stability of western homes. It renders advice and assistance on range problems to people concerned and to other agencies in the Government. Operating under laws and policies designed primarily for resource conservation and for the welfare of the dependent population, its administration and action programs are correlated by the Secretary with those of other agencies in the Department.

In line with the national program of better land use its activities directly affect millions of people and more than 250,000,000 acres of land in the far Western States. The chief concerns of the Grazing Service are to see that the range is protected and people's interest adequately safeguarded. Fundamental in this connection is a prosperous livestock industry stabilized around proper, orderly use of the public lands.

The organization plan approved by the Secretary of the Interior on May 13, 1939, was put into effect at the beginning of the fiscal year. This plan proved advantageous from standpoints of public service, efficiency, and economy. Definite progress was made in orientation of personnel on lines of authority, responsibility, and accountability. Action programs were solidified in the field under the regional graziers.

Plans, policies, and procedure were coordinated by the Director in Washington through four principal administrative branches, namely:

1. Branch of Operations.
2. Branch of Range Management.
3. Branch of Land Acquisition and Control.
4. Branch of Range Improvements and Maintenance.

Delegation of specific duties resulted in better service to the people and greater accomplishment despite the fact that owing to lack of funds, many authorized positions remained unfilled.

OPERATIONS

The new set-up functioned smoothly during the first year of its complete service and with further training, especially in the field, the whole organization, although understaffed for the size of the job, will be in better position to perform the jobs assigned to it.

The administrative staff was increased by 38 members during the fiscal year. The additional personnel was assigned largely to field offices to strengthen local administration, to patrol range areas, and to assist with administration on the ground. In addition to the regular staff, there are 555 district advisers, 74 less than were on the rolls during the previous year.

The reduction in advisory board members followed provisions of the amendment to the Taylor Grazing Act passed July 14, 1939. This amendment limited advisory board memberships to not less than 5 nor more than 12 in each grazing district. As a result new elections were held in all grazing districts during the year. Approximately 80 per cent of the incumbent membership was reelected by the stockmen. On each board there is also a wildlife representative appointed by the Secretary of the Interior upon the recommendation of the appropriate State fish and game official.

The duties of district advisory boards are recommendatory and their services are rendered periodically throughout the year at the call of the regional grazier.

Upon the transfer from the General Land Office to the Grazing Service of functions involving the handling of collections and disbursements of funds, a standard system of fiscal accounting was installed effective as of July 1, 1939. This system enabled the Grazing Service to maintain an accurate current record of all receipts and expenditures pertinent to the consummation of these functions.

Congress appropriated \$650,000 for operating expenses of the Grazing Service during the year. In addition, \$100,000 was provided for payment of travel and per diem of district advisers. The small increase of \$100,000 over the previous year did not, however, enable the Service to keep pace with the expanding program. The average grazing district is about the size of Connecticut and the 53 districts have a gross area of more than 250,000,000 acres. To plan, manage, and execute a program of protection, improvement, and orderly use of this vast area, the Service was allotted only three-tenths of 1 cent per acre.

Receipts from grazing fees in the 53 grazing districts totaled \$786,-204.95 during the year, listed by States as follows:

Arizona-----	\$37, 509. 31	Nevada-----	\$124, 873. 65
California-----	23, 946. 93	New Mexico-----	142, 001. 95
Colorado-----	50, 561. 56	Oregon-----	40, 789. 41
Idaho-----	67, 324. 29	Utah-----	131, 449. 23
Montana-----	35, 799. 79	Wyoming-----	131, 948. 83

The total 6-year cost of administration through June 30, 1940, was \$2,668,000. Grazing fees in that period have totaled \$3,069,-227.10, exceeding the cost of administration by \$401,227.10 or 13 percent. Income from grazing districts can be expected to increase when the Service has been expanded to meet requirements and the carrying capacity of the range has responded fully to the management it deserves. The nominal grazing fees now in effect are admittedly out of line with potential values. Likewise the funds provided for operation are completely out of line with the public values involved.

LANDS

Security in land tenure is the biggest problem facing the livestock man of the West today. If he is to plan and manage his business successfully he cannot be confronted constantly with the hazard of competitive leasing of strategic areas. Neither can he cope with unstable land policies that are naturally inherent in diversified control. To meet these problems both from the standpoints of land use and economy in conservation the Grazing Service took definite steps during the year to improve and stabilize the land pattern in grazing districts.

An analysis of the landownership pattern in grazing districts resulted in the establishment of a general policy to—

(1) Discourage further private acquisition of public land unless such land has inherent or special use values higher than public values.

(2) Consolidate public ownership wherever possible to facilitate administration and promote conservation.

(3) Coordinate use and management of Federal and non-Federal lands through local agreements and cooperative planning.

(4) Promote stabilization of the livestock industry by stabilizing the control and the tenure of interdependent public and nonpublic land.

Steady progress toward these objectives was made during the year. Negotiations are usually initiated by the owners themselves, which testify to the sound principles of the Taylor Grazing Act.

Four principal methods are used to carry out the land-use program:

(1) Cooperation with agencies, States, stockmen's associations and individuals.

(2) Exchange of use agreements. This method is used to consolidate or block areas into suitable administrative units without effecting change of title.

(3) Exchange under section 8 of the act.

(4) Lease under the Pierce Act of June 23, 1938. Under this act the Secretary of the Interior is authorized to lease State, county, or privately owned grazing lands in grazing districts when the lease of such lands will promote the orderly use of the district and aid in conserving the resources of the public lands.

ESTABLISHMENT OF GRAZING DISTRICTS

Three additional grazing districts were established during the year, one each in Montana, New Mexico, and Utah, bringing the total number of districts to 53. The Federal range administered by the Grazing Service totaled at the end of the year 140,847,900 acres, an increase of 6,369,993 acres over the previous year. In addition to vacant lands grazing districts contain State, county, and private lands, and other public lands included in prior withdrawals, such as stock driveways, power-site reserves, military reserves, public water reserves, naval oil-shale reserves and reclamation withdrawals, all tied together in the general-use pattern. A general ownership breakdown of grazing districts is shown by tabulation.

MISCELLANEOUS GRAZING DISTRICT MODIFICATIONS

Effective during the year were 13 orders eliminating 125,897 acres of public land from 10 grazing districts to be used for other public purposes. In this category are lands needed to perfect park and forest boundaries; to enlarge the Black Canyon National Monument in Colorado (2,760 acres); sites for air navigation, areas for use in Federal reclamation, and areas primarily suitable for wildlife protection. Additions to 6 grazing districts involved 38,583 acres of public land, a large part of which was formerly withdrawn for State Carey Act projects. Certain stock driveways established under the Stockraising Homestead Act of 1916 were revoked and made available for grazing administration in California, Colorado, Idaho, and New Mexico. The area involved in these revocations totaled 234,358.35 acres of public land.

Status of Grazing Districts—Approximate Acreages, 1940

State	Number of districts	Gross area	Vacant unappropriated public land	Other public lands	Total administered by Grazing Service	Other lands ¹
Arizona.....	4	15, 179, 000	9, 011, 697	640, 099	9, 651, 778	5, 527, 222
California.....	2	8, 072, 800	3, 209, 095	844, 199	4, 053, 294	3, 969, 506
Colorado.....	5	15, 863, 500	6, 520, 316	580, 439	7, 100, 755	8, 762, 745
Idaho.....	4	21, 914, 300	11, 232, 943	586, 900	11, 819, 933	10, 094, 367
Montana.....	6	32, 045, 930	4, 917, 826	996, 558	5, 914, 384	26, 131, 516
Nevada.....	5	45, 942, 400	34, 073, 296	526, 682	34, 599, 978	10, 942, 422
New Mexico.....	6	37, 629, 100	14, 612, 786	733, 869	15, 346, 655	22, 282, 445
Oregon.....	7	20, 924, 900	11, 916, 520	61, 850	11, 978, 370	8, 945, 530
Utah.....	9	38, 370, 900	24, 544, 822	2, 142, 897	26, 687, 719	11, 683, 181
Wyoming.....	3	21, 735, 700	12, 743, 405	953, 629	13, 697, 034	8, 038, 066
Total.....	53	257, 678, 500	132, 782, 688	8, 067, 212	140, 847, 900	116, 830, 600

¹ Mainly State, private, railroad grant, county, and other prior Federal withdrawals.

PIERCE ACT LEASES

Regulations promulgated during the fiscal year made the Pierce Act effective in all grazing districts. The leasing program under this act will serve a multiple purpose:

(1) It enables the Secretary of the Interior to place large areas of non-Federal grazing lands under proper use and administration without added cost to the owners or to the Government.

(2) It promotes conservation of such lands under regulation of the Taylor Grazing Act.

(3) It enables the Grazing Service to make uniform plans for watershed protection, erosion control, and other conservation activities on lands of interspersed ownership.

(4) It promises to increase revenues to States from school lands in the 10 Western States.

Stockmen themselves operating under Federal license will pay grazing fees for the use of such lands. One lease for 125,000 acres of county tax-delinquent land in Oregon is already in operation. Active steps are now being taken to perfect leases of this nature in Arizona, Colorado, Idaho, Oregon, Utah, and Wyoming. Preliminary estimates indicate that there are at least 20,000,000 acres of State, county, railroad, and individually owned land in grazing districts subject to the provisions of the Pierce Act.

LAND CLASSIFICATION

To protect the public interest and at the same time to afford individuals full exercise of their rights under applicable land laws, rigid standards of classification are maintained in the Grazing Service for proper disposal and management of public lands.

That the full force of the Stockraising Homestead Act has spent itself is indicated by the fact that during the year only 810 acres of land was designated under that act in 4 States, increasing the outstanding area in 21 states to 102,446,620 acres. The pendulum has swung toward applications for special uses, for exchange, for rights-of-way, and for water conservation and use through appropriate classification.

At the beginning of the fiscal year there were 505 cases pending under sections 7, 8, 14, and 15 of the Taylor Act. During the year 492 cases were received, making a total of 997 cases to be acted upon. Of this number 650 cases were disposed of by appropriate action, leaving 347 cases pending at the close of the fiscal year. On the other hand, there were only 43 water cases and no special-use applications pending at the beginning of the year. During the year 513 projects and applications of this nature were received of which 191 were pending action at the close of the fiscal year. During the year 1,240 acres in 6 States were included in water reserves and 1,210 acres in 4 States were excluded from such reserves, increasing the gross public water reserve area in 12 States to 513,686 acres.

COOPERATION

With expanded scope the Grazing Service cooperated with agencies, groups, associations, individuals, States, and counties interested directly and indirectly in problems affecting the western range areas. Railroads and other large landowners aided materially in promoting proper use of land and resources. Licensees and permittees cooperated in a mutual crusade for better range, clearer streams on the watersheds, a healthier livestock industry, and better living conditions in the Federal range territory. Through all these efforts many complications were avoided, proper management was expedited, and real progress made toward accomplishing the objectives of the Taylor Grazing Act.

Government agency participation included action programs in specific areas, agreements for future action, and correlation of policies for the general benefit of the dependent population and the resources involved. Cooperative agreements were entered into with the Bureau of Reclamation, the National Park Service, the War and Navy Departments affecting public lands in grazing districts. Agreements with other agencies such as the Soil Conservation Service, the Fish and Wildlife Service, and the Forest Service were continued. Policy programs for expeditious handling of land problems under applicable law were coordinated in the General Land Office. The Bureau of Ento-

mology helped on the eradication of destructive insects, the Forest Service contributed on developing fire-protection facilities and in training fire-fighting crews. Assistance was received from the Bureau of Plant Industry in the eradication of poisonous plants from the Federal ranges. States agencies and district advisory boards contributed immeasurably to perfecting the mechanics of administration in the varied localities.

The Civilian Conservation Corps and the Army in all corps areas were instrumental in the success of the C. C. C. camp program, enabling the Grazing Service to render a wide range of useful services to the public as well as to conduct successfully a well-rounded range-improvement program in the districts. State colleges assisted in the study of specific problems in widely scattered areas, and in many States these institutions cooperated with the Grazing Service and the Bureau of Agricultural Economics in the analysis of economic problems as they relate to range management.

The 28 cooperative grazing associations in Montana operating under agreements with the Secretary of the Interior were active in fostering unified management and control of intermingled Federal and non-Federal lands in grazing districts in that State. Cooperation was strengthened by the Montana Grass Conservation Act of 1939, which created the Montana Grass Conservation Commission, authorized to cooperate with the Secretary of the Interior in accordance with provisions of the Taylor Grazing Act.

COOPERATION WITH THE SOUTHERN PACIFIC LAND CO.

The Grazing Service entered into a cooperative agreement with the Southern Pacific Land Co. for the administration and proper use of all the unleased lands of that company situated in the State of Utah, amounting to approximately 220,000 acres. This agreement proved mutually advantageous to the Service and to the established livestock operators in the district.

An agreement was negotiated with the same company, providing for an exchange of use on "checkerboard" areas in the State of Nevada. This agreement affects approximately 2,000,000 acres of company land and an equal area of public land and enables the Grazing Service to block areas of grazing lands into suitable administrative units beneficial to licensees and to the Service.

COOPERATION WITH THE BUREAU OF RECLAMATION

A cooperative agreement was entered into with the Bureau of Reclamation whereby undeveloped lands withdrawn for reclamation purposes are to be administered for grazing and made revenue-produc-

ing pending the time that Bureau irrigates the lands or needs them in connection with necessary structures or reservoirs. Under this agreement an additional area of approximately 10,000,000 acres within the boundaries of grazing districts may be administered for grazing purposes.

COOPERATION WITH THE NATIONAL PARK SERVICE

Under certain conditions grazing lands in park reservations may be utilized for livestock. To meet these conditions and to assist in proper utilization of the lands the Grazing Service and the National Park Service entered into an agreement which enabled field representatives of the two services to work out local problems of this nature. Progress was made in Arizona and Colorado where certain park or monument withdrawals embrace large areas of usable grazing land.

COOPERATION WITH OFFICE OF INDIAN AFFAIRS

Cooperative agreements with the Office of Indian Affairs provide for administration by the Grazing Service of certain Indian withdrawal lands pending legislation effecting their final disposal. Under such arrangement, the Chaco District (New Mexico No. 7) was established during the fiscal year. Satisfactory progress in conservation, development, and orderly use of this 3,500,000-acre area resulted from the first year's operation of this district. This is an outstanding example of cooperative work for the benefit of the dependent population.

Large areas of Indian lands in Utah and Arizona were placed under protection and beneficial use through separate agreements with the Office of Indian Affairs.

COOPERATION WITH BUREAU OF BIOLOGICAL SURVEY

Activities in cooperation with the Bureau of Biological Survey which on July 1, was combined with Bureau of Fisheries to form the Fish and Wildlife Service, United States Department of the Interior, brought fruitful results during the year. That Bureau furnished technical advice and leadership on rodent and predatory animal control, wildlife inventories and joint management of game ranges in Grazing districts.

RANGE MANAGEMENT

Encouraging progress was made during the past year in the development of sound range-management practices on the Federal range. Correction of former unsatisfactory and unwise practices coupled with the development of proper use practices featured the program in many

areas. Priorities having been determined and the rights of most applicants established under the law, problems of range management were given added attention.

The number of range users was increased by 1,267 and the total livestock grazed increased 898,322 over that of the preceding year. Part of this increase is due to additional areas being placed under administration. Certain prior withdrawals were lifted or placed under grazing administration through agreements. Such areas were then placed under controlled use. More accurate information on the actual use of all ranges became available.

While the number of users and of licensed livestock increased there were also many adjustments made resulting in reduction of numbers on overgrazed areas. Proper seasonal use in many areas made room for more livestock.

Sudden changes in customs and practices that have grown up over a long period of years are both impracticable and undesirable. Opportunity must be given the livestock operators to make financial and other adjustments on a practicable basis. The support that is being given to the Grazing Service by the stockmen themselves in the development of sound range-measurement practices is indicative of their acceptance of this principle. Wise counsel and assistance received from the district advisory boards contributed immeasurably to the furtherance of the range-management program.

The following tabulation provides the statistical detail of range use of the Federal ranges during the past year:

State	Number of districts	Number of licenses	Cattle	Horses	Sheep	Goats	Total livestock
Arizona.....	4	603	54,863	2,259	119,107	33,342	215,571
California.....	2	719	69,267	3,287	366,040	627	439,221
Colorado.....	5	1,878	162,239	5,540	951,969	116	1,119,864
Idaho.....	4	3,942	163,056	14,314	1,661,276	82	1,838,728
Montana.....	6	1,322	99,982	17,827	750,758	58	868,625
Nevada.....	5	1,978	269,543	13,954	1,081,113	1,846	1,366,456
New Mexico.....	6	1,881	250,462	12,295	529,022	64,240	856,019
Oregon.....	7	1,665	155,918	11,953	536,852	28,720	704,723
Utah.....	9	5,178	192,335	10,442	2,618,918	221	2,850,415
Wyoming.....	5	1,543	155,357	14,497	1,501,267	221	1,671,342
Total.....	53	20,609	1,573,022	106,368	10,116,322	135,252	11,930,964

RANGE SURVEYS

Dependent property surveys.—The work on dependent property surveys continued during the year as an essential part of the program. Property surveys are needed to determine the extent to which applicants are entitled to share in the use of the range. A great deal of factual information has been gathered to expedite final apportionment of range privileges. These data are used also in

setting up a sound basis for the issuance of term permits in lieu of temporary licenses. Progress made in all of the regions indicates that term permits will be issued in many districts in 1941. Primary attention was given to areas where the demand for range was greater than the forage supply or where excessive use was occurring and expert information was needed to support administrative action.

Considerable cooperation in range survey work was obtained from other Federal agencies during the year, particularly in Nevada where cooperative survey projects have been under way during the past two years. These particular projects are designed to obtain factual information concerning soil, forage, economic, and related conditions in the area as a whole to promote sound range practices.

Range studies.—Range study work throughout the Federal range has not kept pace with progress in administrative work. Many problems need to be solved and the Grazing Service is working in selected areas to obtain a solution to many practical questions applicable to range management and livestock production. Stockmen are cooperating in these areas and a fund of valuable information has been obtained.

Carrying capacity surveys.—Surveys to establish safe limits of stocking the Federal range were continued but the limited funds available for this work handicapped desired progress to some extent. Thus, it was necessary to direct efforts in this field mainly to areas where overstocked or depleted ranges required immediate attention.

High lights of progress in the range surveys work are shown as follows:

Classification	Total completed to date	Size of job	Percent completed
Survey of public range.....	¹ 3,815	¹ 12,384	31
Dependent property surveys.....	² 11,098	² 22,895	44
Land status records.....	¹ 5,449	¹ 13,594	40
Base maps.....	³ 465	³ 590	79

¹ Townships (1 township equals 23,040 acres).

² Individual ranch units (vary widely in area and type).

³ State numbered base maps (covering 32 townships each).

Utilization studies.—The method of recording and interpreting range use by following a practical system of range utilization checks was extended over an aggregate area of about 20,000,000 acres in 39 of the 53 grazing districts during the year.

The method which was developed in the Grazing Service gives an index for making practical adjustments in range use when necessary. Factors which influence the degree of use that was made of a given area are weighed and a conclusion reached which assigns the area

either for future intensive study, for discontinuance of grazing, or for increased use as the case may be.

There is much to be learned about the productivity of the various soils on Federal ranges. Only fragmentary information is recorded concerning the usability of hundreds of plant species that grow on these ranges. It is a known fact that certain species withstand excessive use while others decline with only moderate use. The utilization checks are applied systematically over wide areas under a wide variety of conditions, designed to assist both livestock operators and administrative officers in determining the amount of use made of each vegetation species. The utilization checks have indicated clearly a need for better understanding of our forage resources. This type of work is conducted under the direction of the Grazing Service in cooperation with livestock operators who use the land under Federal licenses.

Stockmen have accepted this method of range appraisal and frequently supplement the studies by observations on their own allotments. They have learned the technique and appreciate the values to be obtained from wise range use.

Squaw Butte Range and Livestock Station.—Other important questions dealing with proper management of stock and range require more detailed consideration and study to insure results that can be properly evaluated. For the handling of such problems, the Grazing Service, in cooperation with the Oregon State College and an advisory council of stockmen, is utilizing the facilities available at its 16,000-acre Squaw Butte Range and Livestock Station in southeastern Oregon.

The Squaw Butte Range and Livestock Station, established in 1935, is an effective range laboratory used for working out practical problems of range management and animal husbandry applicable to approximately 40,000,000 acres in southeastern Oregon, northern California, northern Nevada, and western Idaho. In addition to the cooperation given by the Oregon State College and its extension service, valuable assistance was received from the Soil Conservation Service, the Bureau of Plant Industry, and the Bureau of Biological Survey on projects which relate to their respective activities.

FIRE PROTECTION

Protection of the range resources from destruction or damage by fire is a problem of increasing importance in Federal range administration. Insufficient attention has heretofore been paid to this important work, due largely to the absence of funds for the employment of personnel or purchase of equipment to control fires. Fires on the Federal range are due largely to human carelessness. Most range fires occur along

the principal highways and other routes of travel. Because of the character of the vegetation such fires spread usually with great rapidity and heavy damage results in a comparatively short period of time. The fire hazard is definitely increasing each year.

During the fiscal year 1940, C. C. C. enrollees from Grazing Service camps devoted 37,702 man-days to fire suppression and presuppression work on grazing district lands. This is an increase of 28,278 man-days used for a similar purpose the previous year.

During the fiscal year 1940 the fire hazard on many of the western ranges further increased and in some localities became very acute. Increased growth of vegetation, as a result of better management, naturally increased the amount of inflammable material on the ground as this vegetation matured. Generally the areas where the highest hazard exists are those reserved for fall and winter grazing. These areas represent a vital part of the feed required for year-long livestock operations in Federal range States. Fires cause loss of vegetation, increased operating costs and soil erosion and aggravate floods resulting in loss of soil and water.

The following table indicates the number of fires, causes, and acreage burned. No estimate has been made of the actual loss to the Government resulting from such fires, the concurrent loss to operators who would otherwise have used the range, nor the damage resulting from erosion.

Region	Class and number of fires			Causes								Total number of fires	Total area burned
	A	B	C	L	R	D	I	S	C	M	U		
Arizona.....			3							2	1	3	2, 202
Colorado.....	1	11	33	3	1		4	3	8	3	23	45	14, 233
Idaho.....	24	69	188	31	51		48	40	13	22	76	281	174, 701
Montana.....			9	3				2	1		3	9	5, 082
Nevada-California ¹				22	2		9	4	6		25	68	123, 278
New Mexico.....		1	4	2							3	5	528
Oregon.....	4	4	25	7	1		6	6	1	12		33	36, 486
Utah.....	1	8	14	2	2	2	1			5	11	23	25, 189
Wyoming.....		1	20	1		1	1	1		6	11	21	8, 177
Total.....	30	94	296	71	57	3	69	56	29	50		488	359, 876

¹ No record by classes.

Class A fires $\frac{1}{4}$ acre or less.

Class B fires between $\frac{1}{4}$ acre and 10 acres.

Class C fires over 10 acres.

L=Lightning.

R=Railroad.

D=Debris burning.

I=Incendiary.

S=Smokers.

C=Campers.

M=Miscellaneous.

U=Unknown.

The absence of any appropriation for fire-protection purposes was a very serious handicap, and it will continue to be until recognition is accorded in the way of an appropriation to handle this work. The lack of funds for fire control and suppression has been offset in part by the unusually fine cooperation extended to the Grazing Service by many persons and agencies in the range area. While this cooperation is thoroughly appreciated and has been very helpful, it does not and cannot take the place of the needed personnel, equipment, and funds in the Grazing organization. Many fires occur that cannot be reached by other agencies, or they may have fire problems of their own to contend with which prevent giving assistance to the Grazing Service.

Cooperation with the State and other Federal agencies administering Civilian Conservation Corps camps has helped materially. Instructions in the C. C. C. camps and other aid given by the Forest Service in fire-protection and suppression methods and in actual fire suppression have been extremely helpful. The establishment of State fire districts in several States conforming to the grazing district areas placed additional emphasis on the fire question and aided in the enforcement of fire laws.

The initiative of the Grazing Service personnel has been directed toward the development of ways and means of making the public more fire conscious and of practices and equipment suitable to fire control on the range areas. An interesting example of this work occurred in Idaho, where, through cooperation with the State Highway Commission, 129 large signs—Prevent Range Fires—were painted on the surface of State highways through areas of high fire hazard. This work is continuing as a part of the protection job for the summer of 1940.

WILDLIFE

Continued attention was given during the past year to the problem of providing for the needs of wildlife on the Federal range. There has been a noticeable increase in the interest that is being taken by everyone concerned in this very important feature of management of the western-range area. Individual stockmen and the advisory boards on which the wildlife interests are represented have shown commendable interest in making proper provision for the needs of wildlife. The interest thus shown by the stockmen is being met in an increasing number of cases by that shown by wildlife enthusiasts for the welfare of the livestock industry. There has been a meeting of minds in a great many cases which seems to indicate excellent possibilities for developing and working out a cooperative

program that will insure the handling of the wildlife resources on the Federal range in a systematic and orderly way. Past experiences with overpopulations of wildlife and resultant damage to wildlife and the range resources have been kept in mind, and studious attempts are being made to avoid repetitions of past errors.

State and other game officials having to do with wildlife matters in the several States are cooperating closely and effectively with the Grazing Service and the livestock interests in working out projects having to do with either game animals or game birds under the varying conditions existing on the range or which involve range use.

APPEALS AND HEARINGS

There has been a noticeable decrease in the number of appeals from Grazing Service decisions made to the Secretary of the Interior during the past year. Many of those that had arisen in the field during the year, as well as some that had not been heard from the previous year, were amicably adjusted. A planned effort was made during the year to settle prospective appeal cases right out on the range where a better and more complete understanding could be had as to the merits of the cases. This procedure has met with the approval of the stockmen who only turn to the legalistic procedure of appeals as a last resort.

Improved range conditions and the stabilization of the livestock industry being accomplished by the administration has had a tendency to increase the value of range privileges and thus, indirectly, to encourage attempts by poorly qualified or unqualified applicants to obtain recognition for grazing privileges. Complaints sometimes evolving into appeals from this source show some signs of increase, and, in any event, may be expected to continue more or less intermittently for a long time to come.

ENFORCEMENT

Owing largely to the desire of the livestock operators generally to cooperate with the administrative officers of the Grazing Service the number of willful violations of the provisions of the Act or of the Federal Range Code has been comparatively small during the last year.

Two arrests for livestock trespass were made in Utah and when brought to trial in the Federal Court, the defendants pleaded guilty, and, in addition to being fined, were required to make reasonable settlement for their unauthorized use of the public range.

In several cases of continuing trespass occurring in different States, where the livestock found in trespass had not been removed from the

public range after due notice and it was deemed inadvisable by the administrative officers to remove or impound them, relief was sought through proceedings in the Federal courts of the respective jurisdictions.

Actions were brought for the purpose of requiring the defendants to remove their stock, for the recovery of damages incident to the trespass, and to enjoin and restrain the defendants from further grazing their stock upon the public range without license or permit as provided by the rules and regulations of the Secretary of the Interior in force and effect in the several grazing districts in which the trespass occurred. The relief sought was granted by the courts in three cases—one in New Mexico, one in Arizona, and the other in Montana. In a fourth case, which occurred in New Mexico, and where the evidence disclosed that the trespass had terminated before the suit was brought, the proceedings to enjoin the trespass were dismissed, but the defendant was required to pay damages for the unlawful trespass, together with all lawful costs of the suit.

ADVISORY BOARDS

The advisory-board system, originated by the Department as a medium for local advice and cooperation, was made an integral part of grazing district administration during the year by amendment to the Taylor Grazing Act on July 14, 1939 (Public, 173, 76th Cong.). New elections were held during the year in all districts in accordance with an order approved by the Secretary of the Interior on September 18, 1939, amending paragraphs *a*, *c*, *d*, and *g* of section 12 of the Federal Range Code.

This order did not affect the prescribed functions and duties of district advisers under which they had operated since the inception of the code. In the past, however, there had been a tendency to underestimate their qualifications for assistance on problems of range management and thus full advantage was not taken of their knowledge and experience in this connection. To a large extent, therefore, the full inherent value of the advisory board system had not been clearly visualized. Nor was ample utilization made of their practical ideas of range management.

During the past year the advisory boards were brought more prominently into the planning end of administration. The many social and economic aspects of range use and management are well known to these men. Their long experience in particular localities is invaluable and their help in the shaping of plans and policies testifies to the reality of the range problems encountered. Steps were taken to utilize to the fullest extent possible this reservoir of knowledge and

experience in the perfection of plans for better land use and protection of the range.

The Federal Range Code, as adopted in 1938, was found to have certain imperfections. During the past year, therefore, a systematic effort was made to obtain from the 53 advisory boards recommendations for changes in the Code which would strengthen and simplify it and yet not upset any of the acceptable work done heretofore under the administrative program.

Meetings held for this purpose in all districts resulted in the presentation to the Director of practical recommendations for code changes. These recommendations were tabulated and made available for use by a special code-conference committee to meet with regional graziers and members of the Washington staff early in the fiscal year 1941. The code-conference committee was selected by the advisory boards of the respective regions and is composed of two board members from each region; 1 cattleman and 1 sheepman—18 in all.

The plan for this important conference recognized the fact that the members of the respective advisory boards are duly elected officials who represent all the users in the districts concerned. The selection of the code-conference committee from these advisory boards makes possible a continuity of representation directly from the individual stockman on the range to the conference room. Also it will help the Grazing Service to obtain a better picture of the variable physical, economic, and social conditions that exist in the several grazing districts, and should result in many worth-while changes in the code.

RANGE IMPROVEMENTS

The range improvement program kept pace with correlated activities on the range through a consolidation plan that took effect the previous year. This consolidation plan placed actual supervision, detailed planning, and execution of work projects directly under the regional graziers. Thus, in coordinating this work with range studies and range management the funds made available for range improvements under sections 10 and 11 of the Taylor Grazing Act were used with greater effect and efficiency than heretofore. For the most part these funds were used to purchase equipment and materials as well as for maintenance work on existing structures. The major part of labor required to construct new projects under these funds was performed by C. C. C. enrollees, thus enabling wise and efficient use of manpower and funds.

A field unit equipped to correlate engineering standards and to push the safety and job-training programs in C. C. C. camps was established during the year.

Water development to promote better range use continued as a prominent feature of the range improvement program in all grazing districts. There was a definite swing from "spot" planning to "overall" planning which resulted in projects of greater permanent value. More attention was given to range revegetation, flood irrigation, soil and water conservation, and range fencing while there was a noticeable drop in the number of truck trail projects.

MAINTENANCE

The problem of maintenance of existing range improvements was given careful analysis during the year. A survey was inaugurated to list and classify all completed projects to show present condition and usefulness, future need and probable cost of maintenance. This survey should yield an all-embracing maintenance program during the next fiscal year. To push this work there are being developed in each field region, portable trailer units that will be used by roving crews. Such crews can be detached as needed to "ride the range circuit" to repair truck trails, clean out reservoirs, replace troughs, repair spillways and fences, and guard equipment against sabotage.

RECORDS

The flow of reports was studied and a careful analysis made with a view to reducing paper work. As a result the regional offices were made offices of record for work programs thus reducing the clerical work to an absolute minimum consistent with requirements. Arrangements were completed and placed in operation during the year whereby the General Land Office acts as office of record for improvements on Federal range to safeguard the public interest on questions that rise on applications for homesteads under section 7 and for exchange under section 8 of the Taylor Grazing Act. Docket records of all projects will enable responsible officers to keep much closer check on progress of work and will facilitate the planning of future programs.

RANGE IMPROVEMENTS BY LICENSEES

Section 4 of the act provides that stock owners may be issued permits to construct and maintain fences, wells, reservoirs, et cetera, on public lands allotted to them to facilitate the handling of permitted livestock on the public range. The increasing number of such applications is clearly indicative of stability and confidence that pervade the livestock industry in Federal grazing districts. Significant is the fact that range improvements constructed and maintained under provisions of section 4 are willingly paid for by the livestock

operator. During the year 504 permits were issued in the grazing districts covering the following improvements:

Allotment boundary fence_miles_	2,073	Springs	6
Interior fence_miles_	849	Corrals	33
Water facilities	62	Shearing corrals	1
Earthen tanks	52	Lambing sheds	3
Wells	34	Rubble masonry dams	3
Wells and troughs	2	Pipeline	feet_96,736
Wells and windmills	42	Galvanized iron supply house	2
Windmills	3		

CIVILIAN CONSERVATION CORPS

In cooperation with the Civilian Conservation Corps, the Grazing Service advanced its program of useful range conservation work throughout the Federal range.

SAFETY AND EDUCATION

In addition special emphasis was given to training and orientation of enrollees to prepare them for useful citizenship. The C. C. C. program calls for conservation of America's youth as well as for conservation of natural resources. Accepting that challenge, the Grazing Service reexamined and organized its own talents and facilities in order to produce the best possible human results from the 15,000 young men entrusted to its custody. To meet more fully this responsibility a safety and training unit was established in the field during the fiscal year. This unit was staffed with a complement of safety engineer inspectors who visited and revisited the camps and projects to render advice, correlate job-training and camp educational work and assist in healthy orientation of boys in their new environment.

The educational plan was not confined to enrollees. Camp life to be successful must have competent leadership. Project foremen and camp superintendents must have ability to conduct the work program as well as aptitude for leadership and group training. For this reason attention was directed toward leadership in camps through training schedules and written instructions.

Safety bulletin boards on which are posted current records of accident-free days were erected in each camp. Four camps with an average complement of 170 enrollees were operated the entire year without a lost-time accident.

TRAINING

C. C. C. enrollees receive job-training of wide variety and usefulness. Many of the boys become proficient with tools and machinery. Others excel in mechanical drawing or drafting. The varied types of work performed in Grazing Service camps has led

directly to many jobs in private industry. Thirty-one enrollees were honorably discharged from one camp during the year to accept gainful employment, 10 as mechanics, 15 as truck drivers, 1 as sign painter, 1 as cook, 1 as metal buffer, and 3 as salesmen, at salaries ranging from \$80 to \$150 a month. Reports from other camps indicate an average of 20 boys a camp were honorably discharged during the year to accept private employment. In one instance the salary was \$240 a month.

In addition to private employment many enrollees advanced in the Grazing Service organization itself and some went to other Federal agencies. On June 30, 1940, the Grazing Service pay roll listed 82 former enrollees who had been promoted to clerical, technical, nontechnical, and supervisory positions.

Provision was made during the year to give each qualified enrollee a Certificate of Proficiency signed by the Director of Grazing, the camp superintendent, the camp commander, the camp educational adviser and the regional grazier. Such a certificate is a recommendation of the boy's character and his skill in a particular type of work.

COMMUNICATION

The problem of communication between regional offices and main camp and between main camps, side camps, roving maintenance crews, and fire fighting crews was carefully studied. As a result of this study a network of radio communication was installed in several regions. Instruments used are small, portable audio-radio units. Through the cooperation of the Interdepartmental Radio Advisory Committee, the Grazing Service was assigned a frequency for emergency calls. The service records all messages handled and accounts for all time on the air. During the year a plan was set up to train enrollee radio operators, and to extend the system into all of the 10 Western States during 1941.

ACCOMPLISHMENTS

The Service operated 89 camps during the year distributed in the 9 grazing regions primarily on the basis of public-domain acreage and the acute need for range rehabilitation as follows:

State	Number districts	Acres public land	Camps	State	Number districts	Acres public land	Camps
Arizona.....	4	9,651,778	5	Nevada.....	5	34,599,978	17
California.....	2	4,053,294	2	New Mexico.....	6	15,346,655	10
Colorado.....	5	7,100,755	8	Oregon.....	7	11,978,370	9
Idaho.....	4	11,819,933	10	Utah.....	9	26,687,719	14
Montana.....	6	5,914,384	5	Wyoming.....	5	13,697,034	9

The major part of the improvement program includes work on scheduled projects. However, each month in every camp, enrollees respond to emergency calls. They fight range fires, clear snow-blocked roads, and perform numerous acts to relieve human suffering. In Wyoming, a crew of boys was returning to the base camp at the end of the day. They saw an overturned automobile at the roadside, investigated and found a man pinned inside the car. Bringing their first-aid training into play, they made a tourniquet, bandaged the man's wounds, and rushed him to the hospital. The physician told them that their action saved the man's life.

Work projects have been divided into two major classifications:

- (1) Projects to aid range management and facilitate range use.
- (2) Projects to protect the soil and improve the range itself.

Major accomplishments in these two classifications are summarized in the following tabulations:

RANGE MANAGEMENT, RANGE DEVELOPMENT, AND RELATED PROJECTS

Project	Unit	Accomplishments, fiscal year 1940	Total ¹
Springs.....	Number.....	219	603
Reservoirs.....	Number.....	76	269
Wells.....	Number.....	35	183
Fences.....	Miles.....	1,261.0	3,415.9
Cattle guards.....	Number.....	132	392
Corrals.....	Number.....	48	274
Bridges.....	Number.....	55	241
Truck trails.....	Miles.....	1,760.5	6,986.6
Stock trails.....	Miles.....	190.1	2,148.4

SOIL PROTECTIVE AND RANGE PRODUCTIVE PROJECTS

Permanent check dams.....	Number.....	551	6,320
Temporary check dams.....	Number.....	308	47,425
Water control structures other than dams.....	Number.....	5	277
Impounding and large diversion dams.....	Number.....	166	867
Rodent control.....	Acres.....	1,904,510	9,856,608
Insect pest control.....	Acres.....	27,821	135,984
Range revegetation.....	Acres.....	148,026	180,015
Tree planting gully.....	Square yards.....	320	6,800
Diversion ditches.....	Linear feet.....	98,985	499,031
Channel construction.....	Linear feet.....	300	12,041
Water spreaders.....	Linear feet.....	51,094	106,218
Clearing and cleaning channels.....	Square yards.....	35,560	47,245
Pipe and tile conduits.....	Linear feet.....	52,476	234,124
Riprap or paving.....	Square yards.....	11,950	317,415
Fire fighting.....	Man-days.....	37,702	72,485

¹ Includes fiscal years 1935 through 1940.

OFFICE OF INDIAN AFFAIRS

John Collier, *Commissioner*

DEMOCRACY today in peace and war is locked with anti-democratic forms in a world-wide struggle.

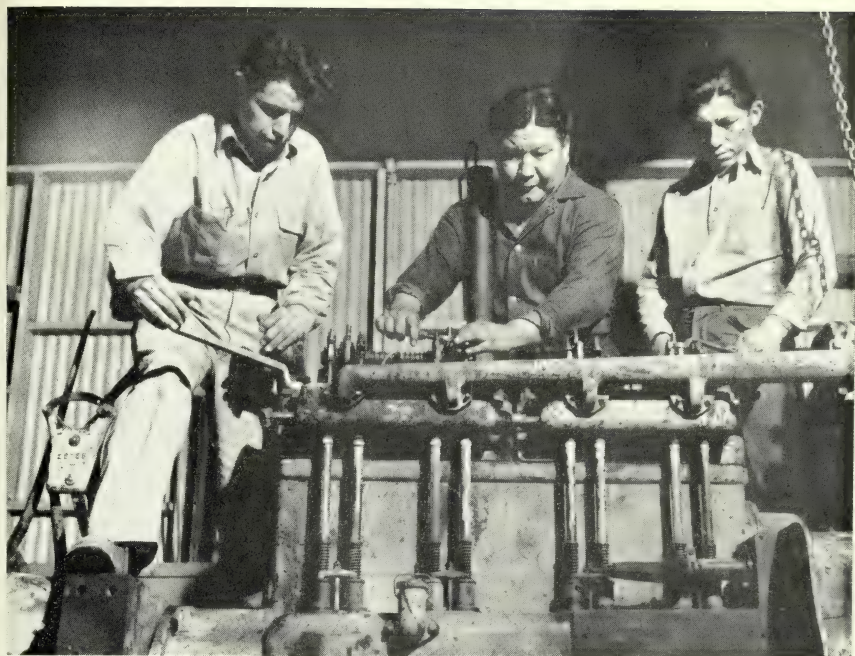
America's Indians within the hemisphere, and within the United States, have waged a very comparable struggle for many lifetimes. In the United States now, at last, they are winning. Their victory, as yet incomplete, is important to our own country and important in the hemisphere effort at democratic defense which has now begun.

Against the background of the greater struggle, the Indian program has been carried forward during the past fiscal year, and a review of the progress of that short period has, to be significant, to cover a 20-year period, against a much longer background. This review has also to look beyond the frontiers of the United States, to the south, to those parts of the Western Hemisphere in which the emerging 30,000,000 Indians may play a decisive role in the struggle for the maintenance of democratic institutions.

The Indians of the United States are a population about as numerous as the city of Seattle, Washington. Numerically they are about one-seventieth of the Indians of the North, South, and Central Americas. Why is it that a minority so small in number should continue to be important in the eyes of 130,000,000 Americans, and of this mighty Government?

* * * * *

The Indians are a Mongoloid stock, which migrated probably from many regions of Asia, at intervals of thousands of years, commencing perhaps 18,000 years ago. The Indians, as early probably as 8000 B. C., had found their way eastward to the whole Atlantic border of North America, and southward across the huge deserts and mountain ranges and the tropical jungles, down to Patagonia in South America. These stocks proved to possess the highest capacity for adaptation, and a tendency toward rapid social evolution, while at the same time they displayed marked tenacity in holding to ancient types—physical, social, and psychological. At the Hemisphere Congress of the Indians, the first ever held under the auspices of 21 American governments, at Patzcuaro, Mexico, in April 1940, all the Indians and all the governments were in agreement that they—the



INDIANS SERVE THE NATION.

Educational advancement enables the Indians to share the responsibility of national defense and civil administration. Upper: Members of the Comanche, Cherokee, and Cheyenne tribes take an advanced course in Diesel motor technique. Lower: Girls from many tribes are employed in the Office of Indian Affairs in Washington.



NATIVE CULTURE PRESERVED.

Age-old beauty of design and workmanship are combined in the handicraft of this Indian silversmith, the authenticity of whose native jewelry is safeguarded under the program of the Office of Indian Affairs.

Indians in all the countries—are a highly individualized resource and problem; that elements of Indian life are, for sociological purposes, interchangeable from country to country, and from continent to continent; also that the Indian has demonstrated in the four centuries since Columbus, a capacity for every technological and social adaptation for which the rapidly changing European-influenced world has called.

Few are the Indians in the United States; and yet at that hemisphere meeting, the scrutiny of Indians and governments was focused upon the historical record and the present Indian program of the United States. For in this record was contained the equivalent of nearly all that was bad in the Indian record of all of the American countries, and there was contained nearly all that the countries south of the Rio Grande once believed they had to fear at the hands of the United States. But in the new Indian program of the United States as cumulatively made effective across the last 12 or more years, there was exhibited nearly all that the Indians of the southern countries could hope for. This new program emphasized the changed attitude on the part of the United States toward a minority of a different culture and blood, a reassurance to the neighboring countries to the south that in it was provided one of the needed foundations for hemisphere cooperation in defense of democracy.

The Indian policies of the United States from 1870 onward were essentially dictatorial toward the tribes and repressive toward the local democracy of the Indians. But several generations of repression in the United States were not effectual in destroying the local democracy of the Indians, or even in fundamentally modifying the Indian types and Indian institutions of local democracy.

At the Inter-American Indian meeting at Patzcuaro, where the diplomats of all the countries were gathered, and in addition the Indian welfare workers of most of the countries, and Indians from half the countries, declarations were enacted unanimously to the effect that the local democracies of the Indians should be regarded as fundamental within the polity, economy, and cultural effort of all the nations of the West. And the two countries which have proclaimed the efficacy of the local democracy of Indians, and have provided for this local democracy a place in the framework of national effort, were accepted as the torchbearers and leaders in behalf of the 30,000,000 Indians and of the twenty countries having Indian populations.

Universally, Indian local democracy is profoundly involved with the possession and the cooperative utilization of natural resources.

Not primarily by the slaughter of Indian caciques, priests, medicine men, orators, and artists, did the Spanish and the Portuguese dominance drive Indian democracy underground, but rather by the separation of the Indian from his land.

And in the United States, the blows struck at the local democracy of the Indian tribes were only in their minor part a repression by the military, and later the civil arm, a banning of Indian languages, Indian tribal organizations, Indian religions, and Indian family life. Here in the United States, as in the Southern countries, the major blow was struck through the destruction of the Indian land estate; and here, that destruction did its most fatal work through the system of forced land allotment, commencing as a universal basic policy 53 years ago.

But how different today is the outlook from that which prevailed in Mexico 35 years ago, and in the United States 20 years ago. Then, Indian democracy seemed to have been reduced to a mere legend, a ghostly sentiment in the minds of Indians and of admirers of Indians. And with the apparent death of Indian democracy, had died, it seemed, Indian culture, Indian energy, Indian group capacity, Indian citizenship, and the spirit of the Indian. The Indian, whatever his biological future might be, appeared to have no Indian spiritual future. And in the United States, his biological future seemed to be that of a rather early extinction.

Without referring further to the countries outside the United States, let us view what has happened within the United States. The progress of Indians toward economic independence has been gratifying, but there are many problems which they and the Indian Service cooperatively must yet solve. A few of these are suggested in this report. The development of an indigenous leadership capable of helping Indian groups to adjust their social organization to the increased demands of a changed civilization is a task only partially solved. The acquiring of a land base adequate for the most meagre subsistence economy for all Indians will require larger and continuing appropriations. The volume of lands in heirship status is increasing. More funds for the purchase of these lands are needed in addition to more trained personnel to carry on programs of land consolidation. Erosion of range lands continues in areas where already the resources are inadequate for livelihood. Extensive irrigation developments and much resettlement must take place to relieve the pressure in these areas.

In spite of these major unsolved problems the future of the American Indian is brighter today than at any time during the past hundred years.

TWO DECADES IN REVIEW

Nineteen Twenty in Indian history was not a year distinguished by any new developments or important official actions. This year is chosen as a datum point because it just preceded a more menacing time, and because out of that menace there was born in the Indian a strengthened will to live and that strengthened will has now conquered. The Indians, as of 1920, were admired for their extraordinary record as volunteers in the World War. The first signs of a renaissance of Indian art had begun to appear among the Pueblo tribes of New Mexico.

The cumulated and inherited official policy in 1920 was moving ahead impersonally and with a ruthless benevolence or a benevolent ruthlessness. That policy was one of extinguishing the Indianhood of all Indians through all devices within the control of a government whose power over Indians was absolute; it included a continuing expropriation of the Indian land.

Since 1887, when the General Allotment Act had been passed, approximately eighty million acres of the best land owned by Indians had passed to whites. A little more than fifty million acres of poor land, half of it desert or semidesert, remained in Indian possession; but the good residue of this land, in all but a few limited areas, was being used by whites on the lease system. The Indians were not organized, capitalized or individually trained to use their own land. The proceeds of the leases went to the support of the Indian Bureau and, as a trickle of yearly revenue usually insufficient for livelihood, to Indians in allotted areas.

The movement to break up the Pueblo Indian tribes, to bestow their lands upon the whites, and to deny the Indian title or equity in Executive order reservations (more than half of the residual Indian lands) was gathering rapid headway in 1920.

The Indian death rate was slowly but implacably rising, and it continued to rise until about 1928 when it approached the birth rate.

Indian poverty, by and large, had become the most extreme that could be observed among any part of the population in the United States.

And everywhere, excepting in certain limited parts of the Southwest, the tribal and the individual life of Indians was managed through a centralized and a horizontal bureaucratic program, under the aegis of thousands of uncodified statutes and of more than ten thousand pages of unassembled regulations, by an Indian Bureau which monopolized all the power over Indians and all the Indian Service.

The situation of 1920 was no matter of swift external disaster, such as flood, drought, or war. The condition of the Indian in 1920

had developed cumulatively across five generations. Only by knowing how deeply down the Indian had been pushed and how long held in suffocation, how long told that he had to die, can anyone evaluate the intensities of rebound which have gone forward in recent years.

Moving rapidly up the years from 1920, we witness first the defeat, in 1922-23, of the official attempt to disperse the Pueblos. We witnessed the enactment of legislation to revest the Pueblos with land. That legislation was passed in 1924. We witness the enactment, in 1926, of legislation placing Executive order reservations upon a parity with treaty reservations, thus vetoing the official plan of 1923 to transfer more than half of the then Indian estate to whites. We witnessed in 1926 the invoking of the help of the United States Public Health Service in an effort to check the rising death rates of the tribes. We see the Indians organizing the council of all the New Mexico Pueblos, a still-continuing active organization, the first example of this Indian political renaissance. In 1924, expressly in recognition of their World War services, full citizenship was voted to all Indians by Congress. In 1927, for the first time, we see an action by the Department of the Interior to bring the light of social science to bear upon the Indian need and upon its Indian Bureau's operations. The monumental study by the Institute for Government Research, known as the Meriam Survey, resulted from the initiative of the then Secretary of the Interior. In 1928, the Senate moved into action, and the hearings and documents of the special committee upon Indian investigations of that body totaled 36 printed volumes by 1939.

With the year 1929, an intellectual revolution was in full swing within the official Indian Bureau. The schooling policies of the Indian Office were fundamentally modified starting with that year. The movement was from uniformity of curriculum to diversity, and from mere classroom activity to community schools.

In 1929 the Secretary of the Interior and the Commissioner of Indian Affairs joined in memorials to Congress, asking for legislation to reestablish the local democracy of Indians, to curtail the absolutism of the Government's Indian system, to apply the concept of constitutional right to Indian economic affairs, and to settle decently and promptly the host of Indian tribal claims growing out of breached treaties and compacts of the past years.

And of inconspicuous but of basic importance was an effort, beginning in 1929, to apply modern principles of personnel work in the Indian Service. That effort is not yet finished.

Public opinion could not move all at once; neither could Indian opinion, nor administrative or congressional thinking. Active, con-

tinuous attention by the Chief Executive was needed; and in 1933, at last, the needed assembled data and administrative trends were available to President Roosevelt. And 1933 and the ensuing years were a time of change within the Government. In general, that change moved toward goals which naturally included the Indian goals of democracy and of the cherishing of the land. So it was without public shock that in 1933 by secretarial order the sale of Indian lands to whites was stopped. Without public shock, the Indian cultures and religions were put in possession of the full constitutional guaranties. Without public shock, the institutionalized boarding schools for Indians were cut by one third and the children were moved to community day schools, and thousands of children never schooled before were brought into the classroom.

Then the Indian Reorganization Act was formulated. The administrators took this proposed reform legislation to the Indians in great regional meetings and through the Indians assembled there, back to all of the Indian communities. For the first time in history, all Indians were drawn into a discussion of universal problems of the Indians, and these universal problems focused upon the most ancient and most central Indian institution, local democracy integrated with the land.

Congress passed the Indian Reorganization Act in 1934, and it incorporated in this act a feature new in Federal legislation, the referendum. The act, as passed by the Congress and signed by the President, was by its own terms merely permissive. Every Indian tribe might adopt it or reject it by majority vote by secret ballot.

The structural features of the Indian Reorganization Act are as follows:

- (1) It prohibits the further individual allotment of lands now owned by the tribes, or to be acquired for the tribes.
- (2) It returns to tribal use lands withdrawn for homestead purposes but not settled.
- (3) It authorizes an annual appropriation of funds for land purchase.
- (4) It makes mandatory the practice of conservation in the administration of Indian lands.
- (5) It establishes a revolving credit fund out of which loans may be made to the tribe and the individual for productive farming and industrial operations.
- (6) It encourages the organization and incorporation of the tribes for self-government and self-management of economic resources.
- (7) It provides funds out of which loans may be made to Indian students seeking higher academic or vocational education.
- (8) It gives Indians a preference basis under Civil Service rules for employment in the Indian Service.

The Indian Reorganization Act, under which today 74 percent of the Indians are living and functioning, does not contain the whole of the present Indian program. There are tribes not under the act which are realizing a creative self-determination not less than tribes that are under the act. And there are many tribes, under the act by their own choice, which have chosen to go forward with their ancient and never-extinguished types of local democracy, rather than to adopt the parliamentary type of self-government.

The developments of Indian health are not within the orbit of the Indian Reorganization Act. Improved and expanded clinical and preventive work, reinforced by better food for Indians and by a new spirit of hope for Indians, have reversed the life-tide of the Indian race. A death rate of 27 per thousand in 1928 has fallen to a death rate of 14 per thousand in 1939. Even the death rate is an imperfect index. Trachoma does not kill, but blinds. The Indian medical service, through its research work in 1936, demonstrated for the first time the communicability of trachoma through a nonfilterable virus, and now through sulfanilamide therapy is eliminating trachoma in whole blocks of Indian country. The trachoma incidence at its peak was 20 percent or more within certain tribes.

Again, the Indian Reorganization Act hardly hints at the developments in the schooling system, for Indians across recent years or in the Indian C. C. C., Indian rehabilitation, and the adult education of Indians.

No mention of Indian arts and crafts is contained in the Indian Reorganization Act. The almost bewildering efflorescence of the Indian arts and crafts is a growth of 20 years, but really it is a rebirth of influences, of conventions, and of genius thousands of years old. The Indian Arts and Crafts Board was instituted in 1935, subsequent to the passage of the Indian Reorganization Act.

The Indian Reorganization Act conveys no suggestion of the changed policies which have stripped the Office of Indian Affairs of its monopoly over Indian services. These services are now diffused among many Federal agencies, and through contract under the Johnson-O'Malley Act, among State and local agencies. The concentrated attention to Indian need and Indian potencies is still the responsibility of the Office, as is the more intensive portion of the Indian educational effort and 90 percent of the Indian health effort. But the Indian Service is no longer a separatist institution, but a crossways of the work of many Federal agencies, State and local subdivisions, and above all, of Indian groups performing and seeking their own services.

And the Indian Reorganization Act gives no more than a hint of that phase of Indian life which possibly is most basic of all. Repeat-

edly it has been stated above that the Indian institution is local democracy, but local democracy integrated with the land. Always in pre-history, this unity of the Indian with his land was a unity of use, of conservative use, of planned use, and of use in the spirit of reverence and even within the aura of mystical religious sanctions.

It was not the mere fewness of the Indians which delivered the territory of the United States to the white man perfectly conserved—primal in its water, soil, herbage, and fauna. There are areas of the United States with a population little or no denser than the Indian populations of pre-Columbian time, where white men have wrecked in a few years portions of the earth which the Indians had conserved through eons.

Under Indian Bureau control, in the years prior to 1933, through overgrazing and unplanned use, even the lands owned by Indians had been damaged and in many instances had been gutted.

The year 1933 witnessed a rising Indian population upon a land base quantitatively very insufficient and qualitatively critically deteriorated. The Navajo range was two-thirds wrecked. The Acoma and Laguna ranges were more than two-thirds wrecked. Through the whole of the West, the Indian ranges were down as low as the average of the western range, which was more than 50 percent down. Eroding Indian lands were threatening to shorten the life term of great reservoirs like the Elephant Butte and Lake Mead. Eroding Indian lands had contributed to the water-logging and the economic ruin of the middle Rio Grande Valley.

Certainly the most dramatic and nationally important phase of the Indian record across the last seven years has been the Indians' own effort at conserving their lands. No groups in the country have made voluntary sacrifices comparable to those self-imposed by tribes such as the Navajo, many of the Pueblo, the Hopi, and others which could be mentioned. These Indians have willed above all that the Indian spirit—the Indian being—should live on, and hence they have willed that their land should live on, their land being a part of their spirit.

Tribes the most archaic in their social forms, such as Acoma Pueblo, have become the advance guards in the adoption and use of modern technologies of land conservation, range management, animal husbandry, and marketing.

Tribes supposedly apathetic if not sullenly resentful, such as the Apache (and this means all of the Apache tribes) have stepped to the forefront as conservators, creators of great cattle herds which do not overgraze, and operators of cooperative enterprises of the most modern types. And in their political self-government these

tribes have become models, deserving study by the white counties or States.

The conservation of water, soil, herbage, and fauna is of national importance, if the economy of the United States is to survive at all. It is of importance almost as pressing in time as military preparation. Here the Indians have shown the way, and even from the quantitative standpoint, what they are doing is of decisive importance to the Boulder Dam, to the whole life of the Rio Grande watershed, and to critical areas of the Great Plains.

But there is something else, more important even than the conservation of the earth and its soil, plants, and animals. That is the conservation of the human spirit through the institution of democracy. The great unanswered question hangs over all free peoples: Can we meet the totalitarian competition, while being more and more, not less and less, free?

The impressive material achievement of the Indian across recent years has been attained through the revival of ancient forms, and the establishment of very modern forms, and the merging of ancient and modern forms, in local democracy. The Indians have proved that democracy can plan and can execute. They have proved that democracy can impose sacrifices on itself. They have proved that democracy can be as powerful in its motivation as the racisms, the economic-mystic ideologies, or the atavistic propagandas of some of the totalitarian countries.

And in this same connection of local democracy, the Indians of the United States have held high a signal to the 30,000,000 Indians of the South and Central American countries, who are in many of these countries the dominant population.

INDIAN POPULATION

Indian population is increasing at the rate of about 1 percent per year as compared with 0.7 percent per year for the general population.

The number of Indians reported under the jurisdiction of the Federal Government on January 1, 1940, was 361,816, indicating an increase of 9,938 over 1939. This figure represents only in part a natural increase, however, as the estimate of the population of the Five Civilized Tribes in Oklahoma has been revised based on agencies reported in Oklahoma from 1930 to 1940.

Organized groups, such as the Chippewa in Michigan and Wisconsin, recently enrolled under the Federal Government's jurisdiction, account in part for the large increase from 327,950 Indians reported April 1, 1934, as compared with 361,816 in 1940.

As the Bureau of the Census figures on Indian population will be available within the next year, it should be pointed out that the figures of the Census Bureau will probably not be identical with the figures reported here due to differences in methods of reporting used by the two agencies. The Indian Service population figures are based on the number of Indians enrolled under Federal jurisdiction, whereas the figures of the Census Bureau are based on residence. Also difference of opinion as to the definition of an Indian constitutes a source of disagreement.

Indian Population Under Jurisdiction of Office of Indian Affairs—Apr. 1, 1934, and Jan. 1, 1940

State	Jan. 1, 1940	Apr. 1, 1934	State	Jan. 1, 1940	Apr. 1, 1934
Total.....	¹ 361,816	327,958	Nebraska.....	4,562	4,498
Arizona.....	¹ 50,539	44,093	Nevada.....	5,455	5,076
California.....	23,281	23,808	New Mexico.....	37,517	34,726
Colorado.....	882	834	New York.....	¹ 6,861	4,523
Florida.....	586	580	North Carolina.....	3,472	3,254
Idaho.....	4,281	4,187	North Dakota.....	11,692	10,287
Iowa.....	473	419	Oklahoma.....	¹ 103,200	94,980
Kansas.....	2,108	1,860	Oregon.....	¹ 5,339	4,644
Louisiana.....	115		South Dakota.....	¹ 28,695	26,695
Michigan.....	¹ 4,704	1,192	Texas.....	344	250
Minnesota.....	16,414	15,200	Utah.....	¹ 2,224	2,124
Mississippi.....	2,025	1,792	Washington.....	¹ 14,103	13,418
Montana.....	16,840	15,255	Wisconsin.....	¹ 13,678	12,085
			Wyoming.....	2,426	2,178

¹ Estimated in part.

TRIBAL SELF-GOVERNMENT

Since 1935 the Indian tribes of the United States have been exploring anew the methods of democracy. In a world in which democracy has been yielding to increasingly effective attack, these efforts of Indian tribes have more than a passing interest.

Indian tribal government derives its basic sanction from the legal doctrine that the Indian tribes were once sovereign nations, and are still domestic, dependent states, capable of exercising any powers of self-rule not specifically taken from them by treaty or by act of Congress. "A weak state, in order to provide for its safety, may place itself under the protection of one more powerful, without stripping itself of the right of government and ceasing to be a state," wrote Chief Justice John Marshall in 1832, and the doctrine has been followed by the courts since then.

In 1934, disturbed by abundant evidence that Indian affairs had grown desperate, that Indian lives were endangered by poverty and disease, and that Indian property was approaching the vanishing point, Congress adopted the Indian Reorganization Act, which declared that the administration of Indian affairs should square itself

with the doctrine laid down by John Marshall. Each tribe should have the right to exercise all its inherent powers—the right to adopt a constitution, the power to operate its own machinery of government, to determine rights of membership (citizenship in the tribe), to regulate domestic relations within the tribe, to levy taxes upon members, to regulate tribal property, including the right to prescribe rules of inheritance, and to administer law and order within the tribal jurisdiction. The possibilities are unlimited. The way is open for an Indian tribe to assume a political and economic control over its internal affairs, as complete as that of any incorporated municipality.

The tribes were not forced to assume these responsibilities. They could reject the law itself if they chose; that was the first application of the democratic process. During the period 1934–36, 266 elections were held. (The Oklahoma and Alaska Indians were not concerned in these elections, as they were brought under the law by subsequent legislation.) In this balloting, 189 tribes (representing 129,750 Indians) voted to accept the law, and 77 tribes (86,365 Indians) rejected it. The elections were by secret ballot, and upward of 60 percent of the electorate participated. The first tribal constitution was formally adopted by tribal vote in October 1935. Since then 135 tribal constitutions have been written, voted upon, and put into operation by the Indians of the United States and Alaska—a venture in constitution-making on a scale which must be unique in history.

Incorporation follows upon political organization, if the tribe wishes to take this further step. As a chartered corporation the tribe assumes additional control of its affairs and further responsibilities. At this time a total of 105 Indian groups in the United States and Alaska have ratified such charters.

The type of organization adopted by the tribe reflects, again, the Indian will. Self-government among Indians, if effective, will follow no set pattern, since the patterns of Indian life are as numerous as the tribes. Some of the most effective native governments, in terms of maintaining social control within the group, are the archaic forms which existed before the first Europeans reached American soil and which have survived the impact of the white race. But whether the tribal government is an ancient one or a twentieth-century product, membership in the governing body, tenure of office, control of procedure, are wholly within Indian hands.

The activities of the organized Indian tribes are varied and are increasing greatly in volume as the Indians become familiar with their opportunities. They adopt law-and-order codes as a means of bringing within the scope of tribal action matters which in former years

were administered by the reservation superintendent and his staff. They enact land-management laws and in some cases are daring to break up old patterns of land use to provide for the young and landless members of the tribe. They are overhauling their membership rolls and, to an increasing extent, insisting that membership shall be based on an active relationship and not a vested interest in possible financial returns. They are developing systems of taxation and disbursement (budget-making), controlling hunting and fishing on the reservation, leasing tribal lands and entering into business contracts of various types, protecting public safety and morals—assuming, in short, the powers of self-government, powers which in many cases the Federal Government had exercised for them in the past.

How is the Indian meeting the challenge of democracy?

On the Western Shoshone Reservation (in Idaho and Nevada) the tribal council has recently instituted an experiment in its jury system. It has set up a permanent panel of 15 jurymen, to which any party to a suit in the tribal court may appeal from the decision of the court. Drawings from the panel of 15 are made until 3 jurymen acceptable to both parties have been found. The decision of the jurymen is final. This provision for appeals is particularly significant in view of the fact that State courts have no jurisdiction in Indian matters and Federal courts have jurisdiction only in certain major crimes, 10 in number. In ordinary cases, therefore, there is no appeal from the decision of the tribal court.

Every tribal constitution has granted women full political equality. Since the beginning of tribal organization numerous women have served as members of tribal councils. The Eskimo Community at Nome, Alaska, just organized, has elected a council of five, of which four members, including the president, are women.

At Fort Belknap Reservation in Montana a mission school has organized one of its advanced classes under a constitution adapted from the constitution of the Fort Belknap Reservation. The students in this class carry on exactly as would the adult meeting; and, in fact, members of the adult council attend the student council, and the visits are returned by the students. The students have worked out a program for the utilization of the reservation resources, strikingly comparable to that developed by the older members of the tribe.

During the spring and early summer of the present calendar year a series of schools were held in several sections of the Indian country for the benefit of members of the tribal councils. The positive result of these schools was the indication that during these 5 years a wholly new attitude has been growing up among the Indian tribes. Self-government has become a thing of meaning.

Progress, admittedly, has not been even. To deny the failures and shortcomings of these 5 years would be to claim too much for the democratic principle; it does not remake men overnight, it does not endow them with superwisdom and supertolerance. At its best it seeks only to remove from men's minds the fear of authoritarian control, to leave each man free to develop his own powers, and to fulfill his responsibility to society. A democratic state is not created overnight, by fiat; it is arrived at slowly and painfully, a product of the deepest aspirations of the men and women making the state.

Naturally, Indian democracy is not yet perfect. In the area of law and order, for example, tribes which have taken over the responsibility of policing themselves and administering justice have gone astray at times and permitted factional interests and personal quarrels to intrude. Again, in the matter of handling finances some tribal officials have shown a lack of civic honesty which is strikingly similar to official conduct occasionally found in other places. These failings have brought demands that the Indian Reorganization Act itself be scrapped, that Indian matters be restored to the absolutism of departmental regulations. Land assignments have not always been granted on the basis of merit; sometimes favoritism has entered into the actions of the governing bodies. A number of ill-considered actions have resulted from a failure to understand the proper scope of tribal authority and the mechanics of tribal constitutions.

But not one of the failings of all these years has resulted from moral viciousness or from intellectual incapacity. Never has there been any question of the ability of the Indian people to rule themselves and to rule more wisely than benevolent absentee authority could. The failings do demonstrate, however, that the Indian Office in the years ahead can be particularly helpful by working with the tribal governing bodies and encouraging them to make full and wise use of their powers and to develop habits of thinking in terms of tribal welfare. The future of the Indians is the stake in this matter.

LAND

The future of the Indian depends upon the fate of his land. From the day of the white man's arrival in the New World, continuously, inexorably, year after year, Indian lands passed from Indian to white ownership. In war and peace, under administrations of every political hue, the loss of land to Indians continued.

By 1886—110 years after the Declaration of Independence—conquest, treaty, and private purchases had whittled the Indian lands to a total of 140,000,000 acres, which were scattered through almost

200 reservations, mostly beyond the Mississippi. But the voracious land hunger of the growing nation had not yet been satiated. The Indian tribes still had land considered ripe for exploitation. Public opinion, however, would no longer condone dispossession at the point of the gun. The same result, nevertheless, was achieved legally by applying the principles of the Homestead Act to Indian reservations. Tribal lands were subdivided. Each Indian was allotted an individual tract of land and the surplus "land not then required for allotment to enrolled Indians" was opened to white settlement. The individualization of Indian tribal property was authorized by the General Allotment Act of 1887 and by similar special acts. It proceeded apace for 40 years, slowed down in 1928, and terminated in 1933. But the damage done to the Indian estate will require generations to repair.

Through the sale of "surplus" tribal lands, of patented allotments, and of land in heirship status, the cruel process of alienation continued. The majority of the Indian tribes subjected to the allotment process objected vigorously, but without avail. With the shrinkage of their land base the Indians' economy, spirit, and local democracy crumbled.

LAND LOSSES CEASE

The loss of land came to an abrupt end on August 14, 1933, when Secretary of the Interior Ickes approved an order of the Commissioner of Indian Affairs prohibiting the sale of Indian allotments and heirship lands except under special circumstances. A year later, by the Indian Reorganization Act, Congress prohibited future allotments of Indian tribal land for all tribes which accepted that act, authorized the restoration to tribal ownership of Indian "surplus" lands which had been opened to entry, and authorized an annual appropriation of \$2,000,000 for the purchase of land for Indians. After four centuries of continuous shrinkage, the Indian landed estate was at long last beginning to expand again.

Between 1880 and 1930 the Indian land loss had averaged 2,000,000 acres a year. In 1934 the Land Committee of the National Resources Board estimated the immediate urgent needs of the Indians for agricultural, timber, and grazing land to be 9,706,000 acres, approximately one-tenth the acreage the Indians had given up during the preceding 50 years. It was also estimated that complete rehabilitation of the Indian tribes on sufficient land which, effectively and conservatively used, would enable them to be self-supporting on a reasonably adequate standard of living, would require another 15,000,000 acres. The completion of this Indian-land program would still leave the Indians with 60,000,000 acres less than they had in 1887.

To carry out the Indian land-acquisition program, Congress between 1936 and 1940 appropriated a total of \$4,425,000. To June 30, 1940, a total of 270,637 acres had been acquired with this fund, with an additional 30,000 acres under option. By restoration to several tribes, 760,000 acres of Indian lands opened to entry had been again made available for Indian use in the same period. The restoration of another million acres is contemplated. By the purchase of submarginal land with emergency funds 902,900 acres were added. Of the public domain about 1,368,000 acres were added to Indian reservations or set aside for Indian use by Congress, and the use of more than 610,000 acres accrued to Indians under the provisions of the Taylor Grazing Act.

TRIBES BUY BACK THEIR LANDS

During the last 3 years several of the Indian tribes have at last seen the wisdom of investing parts of their tribal funds in the re-acquisition of land from the sale of which these tribal funds were derived. Thirteen tribes in 10 States have authorized the use of \$1,647,225 for this constructive purpose, and the purchase of 34,853 acres costing nearly a quarter million dollars was completed by June 30, 1940. Since 1934 the Navajo Tribe has hypothecated its tribal revenue to the extent of \$500,000 for the purchase of 324,000 acres in Arizona and Utah within the boundaries of its reservation. The Navajos are seeking to purchase a similar amount of badly needed grazing land in New Mexico.

From all sources the increase in the amount of land made available for Indian use since 1933 has reached a total of about 4,260,000 acres. Yet this acreage is only a sixth of the urgent land needs of the Indian population, as estimated by the National Resources Committee. The entire amount authorized for land purchases by the act of June 18, 1934, will have to be appropriated by the Congress for many years before satisfactory progress can be achieved in the economic rehabilitation of Indians upon an adequate land base. The sums appropriated for land purchases must be supplemented by sufficient additions to the revolving credit and Indian rehabilitation funds to finance the productive use of Indian lands.

It is interesting to note that those tribes which were allowed to retain in usable form sufficient resources for the support of their members have not been a heavy drain upon the United States Treasury. The Menominee Tribe in Wisconsin, for example, having maintained its timberlands in tribal possession without allotment and having operated this timber on a sustained-yield basis since 1905, has been paying all administrative, educational, and health-

service expenses, including operation of its hospital, out of its own funds. On the other hand, the tribes critically undersupplied with usable resources are requiring increasing amount for relief, not only from the Federal Government but from the States and counties as well. On the Turtle Mountain Reservation in North Dakota more than 1,000 Indian families have been endeavoring to eke out an existence on land barely adequate to keep 200 families from starving. Since drought and agricultural depression seriously restricted opportunities for off-reservation wage work, more than 90 percent of the Indian families have had to be kept alive by work relief and direct relief. Added to the heavy burden of relief for the rural white families, the needs of the Indians proved to be the final straw on State and county welfare finances. As a result, the State and county governments joined in a request that the Federal Government make the Indians self-supporting by purchasing for them sufficient land from which to obtain their livelihood.

ALLOTMENTS HAMPER LAND USE

Fully as important as the acquisition of new lands is the task of readjusting the ownership pattern of the land now in Indian ownership in such a manner that the land can actually be used by the owners. Individualization of tribal lands through allotment not only led to the sale of millions of the best allotted acres but so tangled and complicated the ownership status of lands still in Indian ownership that much of it cannot be used by them and must either be leased to white operators or lie fallow. Many of the original owners have died; their interests in the allotments have passed on to a second, third, and fourth series of heirs until there are numerous instances of 80-acre tracts in which 30 or 40 heirs own fractions of various sizes with denominators as high as one or two millions. Most of these inherited allotments have to be leased and the proceeds divided among the heirs, a sterile operation which compels the Indian Office to conduct a constantly growing rental business, to lease these millions of acres of heirship land, each lease requiring the approval of a majority of the heirs, to collect the rentals, account for them, and divide them among the heirs, with numerous annual payments of a few cents per heir. To this task is added the handling of the leases of many of the allotments still in the hands of the original allottees who are unable or unwilling to make productive use of their own lands.

If the bulk of the allotted and heirship lands, especially grazing lands, were consolidated in proper units and effectively used by the Indian owners, the economic problem on a score of reservations

would be approaching solution. Some land consolidation has been done, especially during the last two years, but the volume of heirship land to be leased has grown faster. More trained personnel and more funds for land purchases are sorely needed to solve this problem.

Thousands of Indian families, now petty landlords subsisting miserably on the tiny rental returns from their scattered allotted and heirship lands, supplemented chronically by direct and work relief, can be made self-supporting by the use of their own land, and the equitable distribution of tribally-owned lands, when certain legal obstacles are removed by Congress and the Indian Office is enabled to concentrate its efforts on the simplification of the ownership status and the consolidation of Indian allotted and heirship lands.

LIVESTOCK REDUCED TO SAVE LAND

The depression that began in 1929 reached its lowest point in 1932. At the same time the blight of drought had been spreading farther and farther over the Great Plains and the intermountain country. These social and physical phenomena had created a crisis in Indian as well as national affairs. To meet this crisis, there was launched in 1933, among other measures, the dramatic campaign for the conservation of human and physical resources which resulted in the establishment of the Civilian Conservation Corps and of the Soil Erosion Service, the latter set up under the Public Works Administration.

The first and the largest of the soil-conservation projects undertaken jointly by these two new organizations was on 18,000,000 acres of Indian lands in the Southwest, on the reservations of the Navajo and Pueblo Indians, upon the initiative of the Indian Service.

The Navajo Reservation, 235 miles long from east to west, 125 miles from north to south, covers the high and dry country of mesas and painted buttes in northern Arizona and New Mexico, spilling over into Utah. It is as large as the State of West Virginia, has only about 10 inches of annual rainfall erratically distributed, is between 5,000 and 10,000 feet above sea level, and is a good sheep country. The adjacent country of the Pueblo Indians has similar characteristics. In both areas the balance between the soil-building and the soil-destroying factors is most delicate. The continuation of that equilibrium depends primarily on the maintenance of an adequate protective cover of grasses and shrubs.

By 1930 the Navajos ran 1,250,000 sheep and goats on range unable to sustain more than 600,000 sheep. The tribe had increased in 70 years from about 10,000 to 45,000. Because the sheep ate the grass and brush faster than it grew, large areas were denuded, deep gullies formed in the shallow center of the cultivated valleys, drained the

rain water off the unprotected slopes before it could sink in and grow more grass, and carried the topsoil from hundreds of square miles in destructive floods to the Colorado River and Boulder Dam. Like an avalanche, the process of accelerated erosion gained momentum every year. Unchecked, the result of the process could only be the early creation of a sterile desert, permanent rationing by the Federal Government of the majority of this largest and most colorful tribe of hitherto completely self-supporting Indians, or their dispersal and disappearance.

The Navajos were confronted with the necessity of bringing their herds down from more than a million sheep to less than 600,000; for the Lagunas and Acomas even greater sacrifices.

There is something to be said for the Navajos' resistance to stock reduction. Even with complete restoration of the reservation, its carrying capacity will not exceed 600,000 sheep, or an average herd of not more than 50 per family if equally distributed. Under the present pattern of ownership, several thousand Navajo families must exist without livestock unless the range available to the tribe is greatly increased. Efforts to enlarge the reservation by purchase of privately owned lands have been consistently opposed by white owners and State officials. Apparently, therefore, the sole possibility of providing the means of self-support for the expanding Navajo Tribe is through the enlargement of the scattered areas of irrigated farm land. That opportunity is limited by the scarcity of water available for irrigation and the high cost of water development. Yet this problem must be faced. More range and more irrigation facilities must be provided if a large part of this virile group of first Americans is not to be placed permanently on a Federal dole.

The Laguna, Acoma, and other Pueblo Indians faced the problem of saving their range lands by the introduction of conservative management methods with a stout heart. During the fiscal year 1940, they completed the drastic program of reducing their herds to the estimated carrying capacity of their lands. In five years they parted with almost 60 percent of their total flocks, retaining only the best of their breeding animals. Several Indian families owning 800 or 900 sheep in 1935 came down to 350 in 1940. Though this smaller number produced more and heavier lambs per hundred ewes, though the amount of wool per sheep almost doubled under proper management, still these families sacrificed a substantial portion of their gross income and gave up any chance for an increase of their operations in the future. They made the sacrifice, they are continuing to make it, because they realize clearly that the future existence of the pueblo as an integrated community depends upon the salvation of

their lands, upon the maintenance of the full productivity of the soil by the application of conservation practices. That realization is slowly spreading among the Navajos.

Since 1933 the conservation movement has been spreading throughout the Indian country. The San Carlos Apaches did not hesitate to sell 1,200 yearling heifers, first-class breeding stock, when this sale became necessary to bring their herd down to the carrying capacity of their range. The Jicarilla, the White River and Mescalero Apaches, the Shoshones and Bannocks, the Utes and the Paiutes on a score of reservations in the intermountain country had by 1940 wholeheartedly adopted the principles of conservation in the management of their range lands. In the Dakotas and Montana restocking of the Indian ranges, almost stripped of livestock during the drought years, is proceeding on a conservation basis.

TIMBER RESOURCES CONSERVED

Conservation of timber resources on Indian reservations began on the Menominee Reservation in Wisconsin 35 years ago when the elder Senator La Follette induced Congress to authorize the operation of the Menominee timber as a unit on a sustained-yield basis. Thanks to this foresighted action, the Menominee Indian forest is still producing timber, and is still supplying the majority of the Menominee Indians with their livelihood and will continue to do so indefinitely.

Except for the continued ravages of the pine beetle the tribal timber of the Klamath Reservation in Oregon will under continued conservative management remain a productive economic asset for generations. On the White River and the Mescalero Apache Reservations, on the Colville, the Spokane, and other reservations the application of conservation principles and the management of the timber on a sustained-yield basis have strengthened the economic position of the Indian communities, maintained their morale, and reduced the relief demands. But conservative management with its beneficial results can be assured only on tracts of timberland in tribal ownership. Where timberlands have been allotted to individual Indians, sustained-yield operations are not assured indefinitely on account of the everchanging ownership of the land and the pressing need of the Indian owners for an income to assist in the development of homes and various industrial enterprises.

The Indian forested and range lands cover approximately 46,000,000 acres located in 20 States. Management problems are infinitely varied; they are complicated by the need of adjusting technically correct programs to the economic and social condition of the Indian owners. Yet the management of the forests, the sale of Indian

timber, the suppression of fires, the administration of the range lands, the direction of conservation surveys and operations on these lands have been carried on at an annual cost to the Government of less than 1 cent per acre. The income accruing to the Indians from their timber resources—\$1,390,000—plus the fees for the use of Indian range by white operators exceeded \$2,100,000 during the fiscal year 1940, an increase of nearly \$300,000 over the preceding year.

INDIAN CIVILIAN CONSERVATION CORPS PROTECTS FORESTS AND RANGES

The high degree of protection given Indian forests and range lands could not have been achieved without the cooperation of the Civilian Conservation Corps. In the control of erosion and the protection of forests and range against fire, flood, and insect damage, the work of the Indian Division of the C. C. C. has been of exceptional value for the Nation as well as the Indians. Conservation practices on thousands of square miles of highly erodible Indian range lands would have been impeded and made difficult without the stock-watering facilities, the thousands of miles of fences and truck trails constructed by the Indian Civilian Conservation Corps enrollees. The Civilian Conservation Corps-Indian Division's participation in erosion-control work has made possible the restoration of the grass cover, the refilling of gullies, the checking of wind erosion, the reseeding of denuded areas on scores of reservations.

On the Great Plains reservations the Conservation Corps enabled the Indian Service to make great strides forward in carrying out the recommendations of the President's Great Plains Drought Commission for the restoration of the water table. In cooperation with several divisions of the Indian Service and other Federal agencies, the Indian C. C. C. participated in a number of projects for the construction of small multiple-use dams to supply water for livestock, refuges for water fowl and fish, for recreation, and the irrigation of small subsistence gardens on Indian lands. In Indian forests firebreaks and truck trails have been built, fire lookout towers erected and manned, insect infestations have been attacked, and new telephone and radio communication lines established.

A most important byproduct of the conservation and resource-protection work of the Indian Conservation Corps is the training received by thousands of young Indians. Since the beginning of the program in 1934, more than 75,000 individual Indians have worked on Civilian Conservation Corps-Indian Division projects and have acquired experience in the construction of bridges, trenches, truck trails, barbed-wire fences, and communication systems. At least 4,000 Indians have learned how to operate and maintain tractors,

trucks, heavy road-building and other automotive equipment including portable welders, compressors and jackhammers, power shovels, rotary wheel scrapers, elevating graders, and other dirt-moving machinery. Special training courses in telephone and radio work have been given to selected enrollees, and summer schools in fire fighting have turned out hundreds of qualified leaders. Within the ranks of the Indian Civilian Conservation Corps there are now available several thousand trained men for service in or behind the front lines of a mechanized force for national defense.

An indication of the valuable skills acquired by young Indians while they serve in the Civilian Conservation Corps is given by the number of enrollees who annually leave ranks for other employment. Out of an average maximum enrollment of 10,000 Indians during the past fiscal year 590 found outside employment, 436 entered the regular Indian Service in different capacities and 1,003 made use of their experience within the economic framework of their own home reservations.

LANDS RESTOCKED FOR PRODUCTION

The attainment of permanent Indian rehabilitation on his land is beset by many obstacles. With few exceptions, such as the Pimas, the Hopis, and the Pueblos in the Southwest, the Indian tribes did not rely in prehistoric times upon cultivated crops as their main source of food supplies. They were hunters and gatherers, supplementing nature's offerings with patches of cultivated corn, beans, squash, and tobacco.

Indians did not improve their social standing by the accumulation and possession of material things. On the contrary, they gained merit by open-handed generosity, by giving away, by sharing their wealth. These traits still persist. Their persistence accounts in large part for the difficulty the Indian experiences in adapting himself to the ways of society which makes primary virtues of industry and thrift, which worships material possessions, and honors him who is able to pile up tangible wealth.

Most of the problem reservations lie in the former buffalo country, the plains region. At the opening of the century the transition from the buffalo to the cattle economy was well under way. Range livestock fitted into the traditional Indian way of life. Though initially the Indian was inclined to look upon cattle as a new species of game animal and treat them accordingly, he was learning fast. The allotting process paralyzed the Indian cattle industry; war prices, wheat, and drought killed it on many reservations.

But the drought was not an unmixed evil. At its height, when the United States bought and slaughtered hundreds of thousands of

cattle which otherwise would have starved, the Indian Service arranged through the Drought Relief Administration to obtain some 25,000 grade cattle and 15,000 purebred for distribution to Indians outside the drought area. A large cattle pool was organized. From it stricken reservations were supplied with new breeding stock, the recipients of the cattle agreeing to repay the pool a yearling heifer for every animal turned over to them. Notwithstanding the heavy drought losses, the organization of this pool made possible the continuous expansion of the Indian livestock industry on scores of reservations while the possession of purebred herds brought about a remarkable improvement in the quality of the Indian livestock. The size of this achievement is illustrated in the following figures:

Expansion of Indian Beef Cattle Industry

	Calendar year	
	1933	1939
Number of cattle.....	167, 313	262, 551
Money income from.....	\$263, 095	\$3, 126, 326
Number of Indians owning.....	8, 627	16, 624

The income from all Indian livestock, including sheep and dairy cattle, showed an increase from \$2,087,000 in 1933 to \$5,859,000 in 1939.

INDIANS RECEIVE CREDIT

The second important factor in stimulating the expansion of the Indian livestock business was the operation of the revolving loan fund established under the Indian Reorganization Act of 1934. Before the establishment of this fund, the Indian did not have access to adequate sources of credit. He could not pledge trust land as security for commercial credit. The annual appropriations for loans to Indians were wholly inadequate to meet Indian needs and, because of their inadequacy, they were all too frequently used for relief instead of productive purposes. Almost 50 percent of all the loans from this revolving fund, now containing \$4,444,100, went for the purchase of livestock, plus an additional percentage for equipment needed in livestock operations.

Despite this excellent showing for the Indian population as a whole, progress in the rehabilitation of the allotted reservations through the expansion of the livestock industry has been discouragingly slow. On the Pine Ridge and Rosebud Reservations in South Dakota, with a population of 16,000 Sioux, a majority of the Indians in 1940 still derived all or part of their living from the Federal Government. They had range land enough to support 100,000 cattle, yet the total

number of cattle owned by Indians was only about 18,000 head, and 55 percent of the families were without livestock of any kind. These two reservations furnish an excellent example of the difficulties encountered in the task of rehabilitating Indians on allotted lands valuable chiefly for grazing.

The total Indian lands on these two reservations comprise 3,120,000 acres, practically all of it allotted to individuals and their heirs. The most productive tracts, especially those along the watercourses, have passed out of Indian ownership. Few Indian families control enough land in one block for even a small cattle enterprise. In order to make a livestock enterprise possible, it is necessary first to block out a balanced grazing unit completely controlled by Indians. In such a grazing unit there may be a hundred or more Indian owners of land or interests in land and 20 or more non-Indian landowners. Nearly all of the land, both Indian and non-Indian, in such a unit may be used under permit by a nonresident operator. To block out and consolidate 3,000,000 acres for Indian livestock production, personnel trained in land exchanges and purchases will be required, plus a continuously available fund for the purchase and leasing of key tracts. Only a bare beginning has been made in this consolidation process. Neither the funds nor the personnel have been available.

LIVESTOCK ASSOCIATIONS

Given a consolidated grazing unit, the next step is the organization of the users and the financing of the operation. Since the best the average Indian family can hope for on the basis of available land is a herd of less than 80 head, much smaller in the beginning, single-family operations are uneconomic. Therefore, a cooperative livestock association handling a number of small family herds on the grazing unit has to be organized. This cooperative method has made possible the remarkable increase in Indian-owned cattle during the past seven years, during which the Extension Division was able to organize 150 livestock associations.

Next a livestock association controlling the necessary grazing land has to acquire cattle. It may obtain some of them from the repayments of heifers to the cattle pool, or it may finance the purchase from the revolving loan fund if the tribe is organized and chartered under the Indian Reorganization Act. In either case the participating Indians must work out with the assistance of the extension and credit agents a program of operations covering the period during which the loan is to be repaid and must make satisfactory arrangements for the proper management of the enterprise.

The same method, advance planning, and insistence on proper management and supervision, has been applied to all loans made to

Indians as far as the dearth of trained personnel and funds would permit. The results of applying sound business methods to these credit operations have been eminently satisfactory. As of June 30, 1940, commitments of \$5,566,546.44 were outstanding, including loans to tribal corporations, credit associations, individuals, and cooperatives. The loans spread over 20 States and Alaska, and included funds for the purchase of livestock and equipment, for the construction and operation of salmon and other canneries, for the operation of fishing enterprises, sawmills, farms, and a dozen other purposes. Despite the far-flung nature and the variety of purposes of this banking business, the scheduled repayments by the Indian borrowers have been made so punctually, the advance planning and the Indian participation in the management of these thousands of enterprises have been so effective, that only a small percent of the loans are delinquent or in the process of foreclosure.

INDIAN IRRIGATION

The grass lands of the northern Plains normally offer some of the finest range in the West, but livestock must have feed and shelter during the very severe winter months. And no operator is safe unless he has a large reserve of hay against the recurring years of drought in addition to his winter feed. In years of normal rainfall, winter and reserve hay can be put up on the wetter parts of the range, provided the hay crop can be financed for holding, but for safe operation during dry cycles, irrigation supplies the best guarantee against excessive losses.

Permanent rehabilitation of the Indians on the Great Plains, in fact almost everywhere west of the one hundredth meridian, requires that the productivity of the relatively small amounts of land remaining available for their use be increased by providing irrigation facilities. The necessity of this process was recognized by the Indian Office as early as 1867 when Congress appropriated \$50,000 for the construction of diversion works and irrigation canals on the Colorado River Reservation in Arizona. Since that pioneer effort, the area of Indian lands susceptible to irrigation has been expanded to 1,250,000 acres, of which 800,000 acres now have distributary systems. About \$50,000,000 will be required to complete the work for the entire acreage in approved projects. The cost of operating and maintaining these Indian irrigation projects averages about \$1,500,000 annually; two-thirds of this cost is covered by collections from water-users. Appropriations for new construction have run from \$2,000,000 to \$7,000,000 per annum. These construction costs become a lien against the benefited lands, but they are not collected while the land remains in Indian ownership.

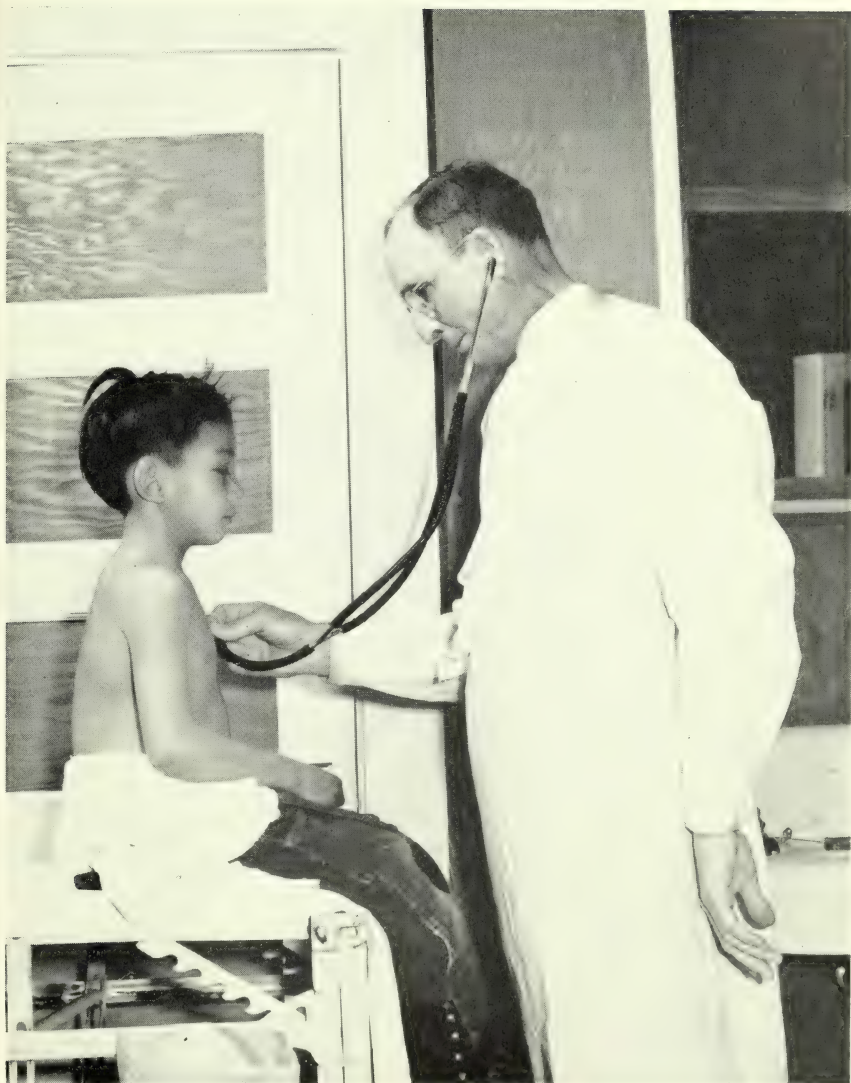
IRRIGATED LANDS AND INDIAN SELF-SUPPORT

The effect of irrigation facilities on the ability of the Indians to support themselves is shown by the example of the 12,000 Pueblo Indians who have produced crops under irrigation for at least a thousand years. For several years, drought conditions notwithstanding, the Pueblos have not received direct relief assistance from the Federal Government, not even Social Security benefits for the aged. On the Fort Peck, the Fort Belknap, Blackfeet, Crow, and Rocky Boy's Reservations in Montana the production of reserve forage on irrigated land is beginning to rebuild the livestock economy of these tribes on a sound foundation. At the same time irrigation for forage production will make possible the correction of improper land-use practices by returning to grass large areas optimistically plowed for wheat production.

In the Plains area the development of water for the irrigation of hundreds of truck gardens varying from 5 to 200 acres is assuring subsistence in drought years to numerous groups; larger irrigation projects in this problem area will in time enable a number of the Sioux Tribes to rebuild their cattle economy on a safe basis and provide an avenue of escape from an almost hopeless situation. By the same token the Navajo Tribe of 50,000 souls must look to irrigation for its eventual salvation. Even though the cost of constructing irrigation works on Indian lands is in the nature of a subsidy, the money is well invested as it helps to keep Indians off a permanent Federal dole and at the same time removes the necessity for destroying the range on the watersheds by overuse and misuse.

GOVERNMENT DOES NOT PENSION TRIBES

It should be emphasized that the United States has never as a matter of national policy supported or pensioned its Indian tribes. The Government is not supporting the Indians now. Because the Indians are the special concern of the Federal Government and because their lands are held for them in trust by the United States, and therefore, are not subject to State and local taxation, the Federal Government under the terms of various treaties has assumed the cost of educating Indian children, of rendering the Indians medical and hospital service, of building roads on Indian reservations, of constructing irrigation facilities on a reimbursable basis, of administering Indian lands and Indian estates, and of supplying agricultural advice and credit for Indian enterprises. Aside from a small amount for the relief of aged and indigent Indians, no money has been appropriated for the unearned use of able-bodied Indians since the beginning of the century except an insignificant amount in ful-



MODERN MEDICINE MAN GUARDS INDIAN HEALTH.

Examinations like this safeguard health among the Indians under the program for national conservation administered by the Office of Indian Affairs.



OLD CEREMONIES AND NEW.

Observance of old tribal customs and increased opportunity for self-government by the Indians is a fundamental policy of administration under the Department of the Interior. Upper: Indians of Taos, one of the 19 ancient villages of New Mexico, perform a religious ceremonial dance. Lower: The Santa Ana Pueblo Tribal Council in session.

fillment of certain treaty obligations. Approximately \$15,000,000 a year, almost one-half of the regular appropriation, is spent for the education of 80,000 Indian children of school age and for the Indian Medical Division. The construction and maintenance of roads, irrigation works, schools, hospitals and quarters absorb another \$8,000,000 annually.

In these appropriations for Federal services to Indians there are no funds for a general Indian pension system, and the appropriations to help the Indians make more effective use of their land, expenditures for agricultural extension work and for credit operations, have averaged not quite \$1,000,000 a year for the last 7 years. Yet it is through the wise, effective expenditure of the appropriations for agricultural extension and credit that the Indians can be lifted out of the economic subcellar and placed in a position to earn a decent livelihood by their own efforts on their own lands.

INDIAN HEALTH

Good health being one of the prime essentials of any program of national defense, the rapid advancement of Indian health work, and the recently accomplished results of the Indian Service program of research and treatment, constitute an important contribution to the national cause. Striking success in the treatment of tuberculosis and trachoma has been recorded within the past year.

The conservation of Indian health, the improvement of Indian morale, and the betterment of the physical, social, economic, and spiritual conditions among the Indians of the United States proper and Alaska cannot be told in detail within the space of a brief report. Only a few of the highlights and some of the interesting background features can be told. It is a story of human conservation, scientifically applied through the medium of medical workers whose application of modern methods must continually be adjusted to the ancient beliefs, ceremonies, traditions, and taboos of the many Indian tribes and bands.

As a privilege of free peoples, tolerance in the practice of local customs and beliefs is essential to a democracy. Yet for generations, religious liberty was not permitted to the Indian tribes, while the curing ceremonials, an essential part of their faith, were discouraged. Few persons considered of value the mental stimulus produced by the powerful song prayers and the fact that through generations of testing, these "Medicine Men" had acquired an extensive knowledge of medicinal herbs and the use of practical therapeutics in the form of massage, sweat baths, cathartics, and cauterizations.

Years ago the Indian people were reluctant to accept modern medicine, because it was in direct conflict with centuries of superstition. The

white doctor performed treatment without ceremonial prayers. And because it was customary with some tribes to abandon the house of the dead it was hard for the Indian to accept the hospital principle. Medicine men among some tribes, particularly the Navajo within the last decade, began a campaign of chants and ceremonies against doctors and nurses. But gradually, as skilled treatment brought the ill back to health and as health education proceeded in the schools, the Indians themselves began demanding new hospitals, clinics, and medical facilities.

As evidence that it by no means wished to interfere with or belittle the Medicine Man's religious role in tribal life, the Government recently invited Navajo medicine men to participate in the dedication of two Federal hospitals. The fact that the Navajo medicine men offered the prayers with which they bless their own homes in the dedication ceremonies demonstrated a reciprocal appreciation and realization of their own limitations in the face of modern science. Of similar interest, a full-blood Osage Indian, Eugene Butler, Jr., presented the Indian Pawhuska Municipal Hospital in Oklahoma a few months ago with an X-Ray machine of the latest model.

HEALTH THROUGH EDUCATION

Care is taken never to force the patient, but to see that he or she completely understands and is willing to undergo the treatment. Native attendants act as interpreters. Parents are consulted in the care of children. No operation is performed, except in the case of accident or emergency, without the written consent or thumb-print signature of the patient.

The increased development of community day schools has assisted this program of health education, bringing both children and adults into closer and continuous contact with health objectives.

Instruction is readily available and not academic, but adjusted to meet local conditions.

In the belief that it is neither necessary nor desirable to change the dietary habits of Indian children simply because these do not coincide with our own tastes, studies of native foods and native ways of preparing foods have been made in certain areas. Indian schools have then included these foods on their menus, thus giving dignity to native customs and encouraging children to evaluate their own practices before discarding them for new ways. Because of the high infant mortality among Indians, instruction in infant care is given in high schools, the class often adopting an infant and giving it full care.

In addition, public health field nurses, agency and hospital physicians through informal talks, prenatal, and general health clinics and home visits are in constant communication with tribal groups. Through their efforts, Indians are learning first-aid, how to care for minor illnesses, and how to carry out doctors' orders.

This approach to health problems has produced very favorable results. Natives now are eagerly asking for information, seeking training as attendants in hospitals, and cooperating in innumerable ways to carry the program forward. There are 92 Indian nurses, 2 Indian doctors, and 44 native nurse aids employed. A Sioux physician, Dr. George F. Frazier, won the 1939 Indian Achievement Medal bestowed by the Indian Council Fire of Chicago.

With the increased use of and demand for hospital facilities, there has been a corresponding increase in medical personnel and construction of buildings. During the past ten years, 14 new hospitals have been completed, 22 have been replaced by modern structures, and 12 have been extensively enlarged or remodeled, and equipped with modern appliances. Many other hospitals have been improved on a lesser scale. There are now 90 hospitals operated by the Indian Service in the United States with 4,500 beds of which over 1,500 beds are for tuberculosis cases.

Beside the in-patient care of hospitalized Indians, dispensaries, or out-patient offices, are scattered throughout the Service in the hospitals and at outlying stations. Here Indians come for treatments which do not require hospitalization, but warrant medical care.

NAVAJO USE OWN FUNDS FOR DENTISTRY

Dental treatment was given to a great many patients by full-time itinerant and hospital dentists and to many other patients by part-time dentists. Native interest in this work is evidenced by the fact that the Navajo Tribal Council petitioned Congress to set aside \$5,000 of their tribal money for the development of a dental unit in their new hospital at Fort Defiance, Ariz. The petition was approved and the Indians are reimbursing their tribal fund with the payment of dental fees.

Additional medical facilities have been provided by operation of the Johnson-O'Malley Act of 1934, authorizing cooperative contracts with State board and local health units for services to Indians. By Executive order of May 1936, Indian Service physicians were authorized to accept appointments as deputy State health officers, making them valuable liaison officers between State and Federal Governments.

Cooperative health programs may be seen on a large scale in Oklahoma, North Carolina, California, Wisconsin, Minnesota and, to a small extent, in Utah. Where full-time health services are operated by State or local boards of health in the vicinity of Indian reservations, they are partly financed by Indian Service appropriations. State Boards of Health are responding generously in the control of venereal disease among Indians by the use of State laboratories for blood examinations, by opening State clinics to Indians, and, in instances where Government facilities are not available within the immediate terrain, by providing medical care on a contract basis. Thus by a combination of Federal, State and local resources, a more sensible approach to the prevention of disease for a whole population is achieved.

The United States Public Health Service, through its engineer corps, made possible a sanitary engineering service which has been available to the Indian Service for some years. During the last year 100 agencies and Indian institutions were visited and surveyed, 64 reports of surveys were submitted, 64 conferences attended, 8 water-treatment plans prepared, 12 sewage-treatment plans prepared, and 74 Indian Service sanitary plans reviewed.

RESEARCH IN TRACHOMA AND OTHER DISEASES

In the field of medical research, much attention is being paid to the treatment of tuberculosis. The general tuberculosis rate among Indians is nearly 10 times that of the white population and the death rate is five to six times as great. Intensive medical surveys to discover the incidence of the disease have been made and are now in progress on several reservations.

The Director of the Henry Phipps Institute of Philadelphia, Pa., is a consultant in tuberculosis for the Service. Every year doctors and nurses of the Indian Service are sent to the institute, not only for specialized training in tuberculosis, but to assist the institute in the examination and interpretation of the thousands of X-ray plates sent in from various reservations.

Under the immediate direction of the Phipps Institute, outstanding studies are now being undertaken on the effect of the Bacillus Calmette Guérin vaccine, or B. C. G., in the control of tuberculosis. The studies embrace four scattered reservations in the United States and a group of natives in southeastern Alaska. To date, 1,565 children up to 19 years of age have been given this vaccine intradermically in doses of from 0.10 to 0.15 milligram. Up to the present time only 6

cases of pulmonary lesions, 4 being of the childhood type, have been reported among the B. C. G. group as compared with 30 cases reported among the control group, 21 of which are of the childhood type. These studies on the effects of vaccination have been extended to new-born children, but have not progressed to the point where a report can be made.

The eye disease, trachoma, is a great scourge of the Indian race. The rate varies according to the tribe, ranging from as low as 1 or 2 percent in some tribes to 30 percent in others. Trachoma is treated both by hospital and field physicians and by an itinerant group of trachoma specialists and nurses. In the past trachoma has been treated by surgical procedure, with applications of copper sulphate, silver nitrate, chaulmoogra oil, boric acid, and other chemical compounds common to trachoma therapy.

Cooperative work by Dr. Phillip Thygeson, of Columbia University; Dr. Polk Richards, of the Indian Service; and the late Dr. F. T. Proctor, of Santa Fe, at the Trachoma School on the Fort Apache Reservation, Ariz., demonstrated that trachoma was due to a filterable virus. These findings were reported before the American Medical Association in June 1938. At the same meeting Dr. Fred Loe, of the Indian Service, reported his early work with sulfanilamide in the arrestment of trachoma. Since then experimentation with sulfanilamide therapy has gone on intensively in a few centers and results have exceeded the most optimistic expectations. During the last year, 1,023 Indians started sulfanilamide treatment and 959 completed the treatment after three weeks. After three weeks 43 percent were pronounced arrested and 50 percent improved. Subsequent arrestments and improvements were found on later examinations after all treatment was stopped. After these encouraging results treatments are being extended further this year, and the whole plan of attack on the trachoma problem modified accordingly.

Other research studies have been conducted, such as investigation of infectious dysentery among infants and children of the Pueblos, and investigation of the relationship between dental caries and dietary habits among a primitive group of Indians in Alaska. The dental investigators reported that the use of refined sugars was the main factor in promoting dental caries.

A malaria survey among certain Indian groups in southeastern Oklahoma, where the rate of severe malarial infections is reported to be very high, is now in progress. This survey was undertaken in cooperation with the State board of health in May 1940 and will be completed by this fall.

DEATH RATE IS DECLINING

Through a combination of efforts in the field of medical care, research, and public health, there has been a decrease in the general death rate through the years. The death rate for the calendar year 1938 was 13 per thousand, as compared to 14.9 per thousand for the year before. The birth rate remained about the same, 22.7 per thousand live births during the calendar year 1938 as compared with 22.9 for the year before. This gives the Indians an increase of births over deaths of 9.7 per thousand.

SCHOOLS AND THE USE OF INDIAN RESOURCES

Teaching Indians to make wise use of their own resources, encouraging and assisting them toward better self-expression, fitting their cultural and other gifts into the pattern of national and community life, finding new and more effective ways of teaching basic conservation facts, and discovering and recruiting better Indian Service teachers: these have been some of the high-lighted activities in the broad field of Indian education in the past year.

There has been a great emphasis throughout the Indian schools, not only on the preservation or revival of native handicrafts, but also upon self-expression through painting, wherever possible, in a perpetuation or revival of traditional forms of expression.

The Santa Fe Indian School, located in the heart of the Pueblo Country where painting is a prehistoric art, has gained increasing prestige for the work of its students. In 1940, a 17-year-old artist, Ben Quintana of Cochiti Pueblo, N. Mex., a student at the Santa Fe School, won a first prize of \$1,000 in a Nation-wide art competition among 52,587 high-school students. Seven other young Indians out of a total of 10 who entered the contest also received cash awards, and 1 youth, an honorable mention.

During the past year Andrew Standing Soldier, a young Sioux artist, was commissioned to paint the murals for the Post Office at Blackfoot, Idaho, on the Fort Hall Reservation, where a group of Bannock and Shoshone Indians live.

Six other Indian artists—one from Zia Pueblo, one a Navajo, an Oklahoma Apache, two Kiowas, and a Pottawatomie from Oklahoma—were selected to decorate with murals two large rooms in the new Department of the Interior Building, Washington, D. C.

These are the success stories of a few gifted individuals. The Federal Government will continue to encourage them and others in creative expression, emphasizing always the desirability of perpetuating native art traditions, but recognizing the right of Indian genius to assistance in whatever form it may appear.

CHANGED REQUIREMENTS FOR TEACHERS

Until three years ago it was possible for a young woman who had never lived anywhere except in a modern apartment building where she turned on the heat, pushed a button for light, and telephoned to the store for groceries, and who had taught only white city children an established curriculum, to pass brilliantly a Civil Service examination for an Indian Service teaching job. Subsequently, she might find herself living in a cottage 60 miles from the nearest town and 40 miles from medical help via dirt roads, stoking a wood stove for heat, cleaning oil lamps, and teaching a varied group of Indian children who understood little English and little of white ways, and whose main concern outside of school hours was helping their parents to get enough to eat from inadequate land.

These Civil Service teaching examinations have been completely revised through cooperation between the Indian Service and the Civil Service Commission. Within the last two years two examinations have been announced which demand qualifications more in keeping with Indian Service needs. Rural living, training for rural life, teaching in schools which actively participate in community activities, and experience in adapting curricula to local needs, are some of the qualifications now demanded in the examinations which are supplemented by personal interviews tending to reveal such human qualities as initiative, ingenuity, and sympathy with the problems to be faced.

Teachers chosen through these newer examinations are being sent into remote Indian communities. These teachers make friends with the older Indians of the community, inaugurate school gardens which rapidly spread to become community gardens, and through initiating school children in the care and value of livestock and farming, arouse community interest in the school program. Adult women in the community are encouraged to visit the school to learn how to cook, sew, and preserve the newer foods in newer ways. The men of the community are invited to use the tools and equipment of the shop for home improvement and care of farm equipment. Close cooperation between such teachers and representatives of the Extension Division have doubled the effect of both the educational and agricultural extension work on many of the reservations.

SUMMER SCHOOLS FOR IN-SERVICE TRAINING

Besides revitalizing the Civil Service requirements for teachers, the Indian Service during the past four years has sponsored a series of summer schools to aid teachers as well as other Federal employees to

understand the specialized problems of the many diversified Indian communities.

One-third of the Alaska teachers (77) spent 6 weeks this year in active exploration of Alaskan problems, and more than 130 teachers from the Northern States spent four weeks at Chemawa, Oreg. The Santa Fe summer school drew the largest attendance of any Indian Service summer school, over 400 employees being registered.

To familiarize adult Indians with the educational program on the largest and most difficult of all reservations, adult schools were organized for periods of 10 days to two weeks each at several of the Navajo Service boarding schools during the year just past. Fifty-five Navajo men and women, ranging in age from 19 to 71, attended the first of these two-week sessions at the Wingate Vocational High School in New Mexico. Community leaders, school board members, and present and former council members, keenly interested in the future of their people, made up the major part of the group. Many of them had never slept in a bed before and were totally unfamiliar with white ways of life. Most of them were illiterate and had never learned to speak English.

The success of this and later sessions held at other Navajo boarding schools has led to plans for similar programs in the future.

Despite the efforts of missionary groups and the Federal Government, more than 95 percent of the adult Navajos are still illiterate. Although school facilities have doubled on the reservation during the last eight years, more than one-third of the children of school age are still not enrolled in any school. Communication with most Navajos must, therefore, take place in the Navajo language through the services of native interpreters, many of whom have themselves only a limited education. To facilitate the interpretation of English material into Navajo in advance of its oral delivery, and in an effort to spread literacy among the Navajos in their own language, the Government has for six years been encouraging the development of a simple popular Navajo alphabet.

In the past year appeared a simple, popular alphabet suited to use with the average typewriter or linotype, which will be introduced in a limited number of Navajo schools during the coming year.

TEXTBOOKS IN TWO LANGUAGES

Simple readers on Navajo life, both in English and Navajo, have been prepared. Also large colorful posters by a Navajo artist, illustrating key points in sanitation, stock breeding, farming, or education, have been prepared for posting at day schools, trading posts, and other centers. A phrase book in Navajo and English has been prepared

for use by the Indian Service Medical Division. Study is under way on a Navajo dictionary.

A similar attempt to encourage literacy in the native language has been undertaken on the Hopi Reservation. At the urgent request of the Dakota Sioux, similar materials in English and Teton-Lakota, the most widely used of the Dakota dialects, are in preparation.

The Education Division has also undertaken the publication of several other series of booklets for use in Indian schools to provide a basis for the study of Indian history and to promote the preservation and development of native handicrafts. The life and customs of the Southwestern tribes are being treated in a series of pamphlets published at Sherman Institute, Riverside, Calif., four volumes of which will be completed during the current year—(1) The Northern Paiute Indians of California and Nevada; (2) The Indians of Southern California; (3) The Papago of Arizona and their relatives, the Pima; and (4) The Pueblo Indians of New Mexico. The Indian handicraft series already contain (1) The Quill and Beadwork of the Western Sioux and (2) Navajo Native Dyes. Others in this series now in preparation include "Pueblo Embroidery," "Seneca Basketry," and "Handicrafts of the Ojibwa."

Another type of booklet published during the past year by the Indian Education Division contrasts in pictures the tragedy of soil erosion with the fruits of range control.

Cooperatives for Indians, a series of lesson sheets on organization of consumer and marketing cooperatives, provide information for those tribes wishing to organize tribal enterprises under terms of the Indian Reorganization Act of 1934.

Young Indian artists have been employed to illustrate most of these pamphlets and the printing has been handled by student apprentices in the print shops of several Federal Indian schools.

BEGINNERS LEARN CONSERVATION

With the cooperation of the Soil Conservation Service, simple conservation facts have been incorporated into the teaching of the fundamentals of reading, writing, and arithmetic, particularly in the semi-arid Southwest.

While still in the lower grades, Indian children begin learning simple conservation principles through demonstration on land outside the classroom. As they progress to higher grades, the study of conservation and the land is correlated with the study of American history and the geography of the country as a whole.

Twenty years ago the Federal Indian boarding schools required students to do much of the manual labor connected with the maintenance and operation of these schools. Today, while many young Indians may be seen working around the schools, they do so of their own choice. Through the selection of certain subjects, they may earn a little cash as spending money or a share in the livestock, poultry, or whatever other field of activity they have chosen as a vocation after leaving school. In the day schools students often begin farming on their own land or that of their parents under the supervision of skilled instructors. In the boarding schools those students who select agricultural training may, through contract with the school, borrow a certain number of livestock, poultry, or seed, and through their enterprise return the cost of the school's original investment, as specified in the contract. At graduation they take their material assets home with them, where they may serve as a beginning for their future enterprise, or sell them for cash.

Since 1936, 40 agricultural instructors have been added to teaching staffs in important Indian areas, and the number of student enterprises has almost doubled every year.

As a step toward adjusting the Federal-school programs to the varying needs and opportunities for Indians to secure economic self-sufficiency in different Indian localities, surveys have been made in four widely diverse Indian areas.

The surveys indicated that two-thirds of the graduates from Federal Indian schools found full or part-time employment. About half of this number received employment under Government auspices, many of them in the Indian C. C. C. or W. P. A. while many of the remaining students were not receiving wages but were employed at home assisting with the family enterprises or managing their own. Important was the fact that only a negligible number of Indian students found employment in private enterprise. At Pine Ridge, S. Dak., only three out of 128 boys surveyed had obtained jobs in private industry, despite the fact that Indian students attending the Federal vocational or trades schools receive much more intensive training than white students experience in most public schools.

DAY SCHOOLS ARE COMMUNITY CENTERS

The Indian day schools are increasingly undertaking to supply resources to be shared by the entire community. For example, on many of the Arizona and Dakota reservations the primary need has been the development of an adequate supply of potable water, and the day schools have led in developing water sources for the use of the immedi-

ate communities. In other areas the day schools may serve as gardening or livestock centers.

Community bathing and laundry facilities, as well as workrooms with sewing machines and other equipment, are made available to all the adult members of the area, as well as to the children. Showers at the day school are supplementing the sweat baths, sand baths, and similar native methods of achieving cleanliness in arid areas. Many Indian women are bringing the family wash from distances of 10 to 20 miles to make use of the white man's laundry and bathing facilities.

In 1929 there were 131 Federal Indian day schools in the United States. The number today has increased to 211; and since 1933, Indian school children's attendance has more than doubled. Adults also have responded in increasing numbers to the educational program during the past seven years as more and more community facilities were made available at the day schools.

The attendance at the boarding schools has proportionately decreased, as the day schools have been established. Since 1933 the boarding-school attendance has dropped about 6,500. In the past 10 years, 25 reservation and nonreservation boarding schools have been closed.

The total number of all Federal Indian schools, including the reservation boarding schools, many of which have been reorganized as vocational high schools, operating on a day as well as a dormitory basis, number about 260. Other schools are now under construction, and still more are needed.

In those areas where Federal Indian schools are not maintained because other schools are accessible, the Federal Government contributes to the State or private agencies a part of the cost of schooling children of one-fourth or more Indian blood. An estimated 45,000 Indian children attended public schools during the past year in all the 27 States in which Indians are under Federal jurisdiction.

INDIAN EMPLOYMENT

The passage of the Indian Reorganization Act in 1934 giving Indians preference in the Indian Service staff increased the number of a few hundred permanent Indian employees in 1933 to 4,682 permanent employees in 1940. As of June 30, 1940, there were 8 Indian superintendents, 251 Indians in professional positions, 935 Indians in clerical jobs, and approximately 3,475 Indians in other skilled jobs.

The Indians in regular and temporary positions represent over one-half of the entire Indian Service staff. In addition thousands of Indians have been employed intermittently to build roads, hospitals,

schools, wells, dams, community buildings, and homes on their reservations. Through the Indian C. C. C. division and the extension of other such emergency funds as P. W. A., W. P. A., and emergency relief, many necessary physical improvements have been installed on 200 reservations, while at the same time thousands of Indians have received employment and training opportunities in skills formerly unavailable to them.

Today there are more carpenters, painters, mechanics, truck drivers, radio operators, machinists, surveyors, draftsmen, and engineers among the Indian population than ever before.

Only a decade ago the arduous trails and bypaths on Indian reservations restricted travel and were a positive barrier to economic and social development. Day schools were well-nigh impossible; doctors and nurses reached homes of the sick only after long delay and much difficulty, if at all; large areas of land were inaccessible; and farm and home services were but partially effective.

During the past year 263 miles of new roads were completed, 184 miles of road were regraded to adequate standards, 278 miles of road were gravel surfaced, and 118 miles resurfaced; 87 major bridges were built. There are now 5,232 miles of serviceable graded roads on 200 reservations in 24 States. There still remain, however, numbers of Indians in inaccessible locations reached only occasionally by the Federal Government's services. Improvements must be made on 6,150 miles of old and nearly impassable roads and trails before urgent requirements are met.

Many of the reservation roads constructed during the past seven years are connecting links between important Federal and State highways. They form part of the major network of roads available for military transport and provide access to material defensive resources.

The Indian is coming to be recognized as a competent road builder, and a considerable number have recently obtained skilled positions with private contractors and other road-building agencies. Road and bridge construction alone under the Indian Service has provided employment for as many as 14,000 Indians in a single season. As a result, there are today over 1,300 well-trained Indian mechanics in this field alone. Many of the road projects are manned 100 percent by Indian labor.

In the construction of buildings on Indian reservations during the period 1933 to 1939, approximately 80 percent of the funds spent for labor went to Indians. Thus Indians earned an estimated \$7,926,000 during these years in constructing schools, hospitals, and agency quarters operated by the Indian Service.

During the past fiscal year, 21 schools, 42 cottages, 12 dormitories, 7 barns, and 4 office buildings were among the 107 Federal structures constructed on reservations. This brought the number of modernized Federal buildings, sponsored by the Construction Division during the past 7 years, to a total of approximately 500.

On the basis of estimates submitted by various superintendents, about 570 more administrative buildings will be needed during the next 6 years, including 62 schools, 35 employees' buildings, 13 hospitals, 224 cottages, and 129 dormitories.

Probably most important to the Indians themselves have been the projects provided by the Rehabilitation Division through the Emergency Relief Appropriations Acts of 1935, 1937, 1938, and 1939. Although the funds have been limited, providing not more than an average of 6 months' employment for 2,000 Indians annually, the use of the funds in conjunction with the coordinated efforts of other divisions of the Indian Service has been far-reaching.

In helping the Indian to become self-supporting, in some areas the Federal Government is faced with the problem of complete resettlement of Indian families. For example, many Blackfeet Indians moved to Browning, Mont., as no opportunities existed for them to work on their outlying reservation lands. They lived in hovels in the vicinity of the agency headquarters. Other Blackfeet families were scattered about the reservation, eking out an existence wherever they could find it. Through the rehabilitation program, 50 families were established on irrigated tracts of reservation land, where they built houses and barns, planted gardens, and acquired livestock. Additional grazing land was made available to them. Some of the families who have now been settled for two years have made exceptional progress. They have kept their houses in good condition, increased their herds, and met their credit obligations.

Of similar interest is the rehabilitation of a group of Indian families living in dilapidated shelters along the Swinomish Slough, near La Conner, Wash. An eyesore to the people in the vicinity, this Indian community earned a meager livelihood by fishing. Attractive homes were built somewhat back from the slough, and the water front was cleaned up. These Indians very promptly became self-respecting people.

Other Indian communities have been given assistance in various ways: in establishing arts and crafts centers; in constructing granaries, canneries, root cellars, sawmills, dipping vats, and other projects which the community as a whole could use.

During the past year, 449 new Indian houses were built, making a total of 2,482 constructed during the rehabilitation program. Old

houses repaired during the past year numbered 872, bringing the total number of old houses which have been made livable to 4,540. Twenty-four community self-help buildings were under construction and 21 others were being repaired, bringing the total number of Indian self-help buildings assisted through emergency funds to 241. Work was undertaken on 65 canning and sewing centers during the past year, and numerous other community projects were in operation.

EFFORT TOWARD BETTER PERSONNEL

The beginnings of modern personnel work in the Indian Service were made in 1939. Indian participation was sought in all Federal activities concerned with Indian affairs, and this participation was given added momentum by the Indian Reorganization Act of 1934, by the conservation programs carried out largely by the Indians themselves; and by the cooperative planning for economic and political self-sufficiency in which the Indian plays a primary role.

The ideal of the Indian Service personnel has been initiative and anonymity, to the end that the Indians should eventually lead themselves.

With the objective of providing for the Indian's present-day needs without destroying his future capacity for self-government, the Indian Service has made many changes in its personnel policy:

1. Much responsibility formerly held by Washington officials has been shifted to the field superintendents and their staffs. They have been encouraged, even required, to develop programs of work fitted to the extremely variable local situations.

2. Constant examination of the employed personnel, with a view to discovering any shortcomings which training might overcome or undeveloped capacities which training might perfect, and any unused talents which a changed job in a new locality might bring into use. This analysis of the employed personnel has not yet been brought abreast with comparable work in other Federal agencies. But the whole organization of the Service, including its field offices, has been awakened to this most insistent of all problems: that of determining how each employee can best serve the Federal Government and the Indians, and how each employee's potentialities can best be developed, through in-service training or supplemental education in colleges and technical schools.

3. Expansion of in-service training. This training is carried on not only at the summer schools for field personnel but has pervaded the regional meetings of technical and professional personnel, the superintendents' councils, and the activities of many local jurisdictions.

4. Developing future administrative personnel. The experiment of the Southwest Field Training Program at Albuquerque, N. Mex., is now three years old, and while the program is far from perfection, it can no longer be considered merely experimental. A limited number of college graduates seeking a career in the public service are chosen from several hundred applicants at the universities each year. For 12 months these dozen or so men are trained and tested through administrative assignments of increasing severity and complexity. Each one is assigned directly to an Indian community. For example, one trainee was asked to study the trading problem at Zuni Pueblo, N. Mex., and work out an agreement relating to the traders' prices and the debts of Zuni Pueblo Indians, while negotiating with the traders for the establishment of uniform prices on certain staples purchased by the Indians.

A grant by the Rockefeller Foundation, approximately matched by Government funds, supports the program which is operated through a cooperative agreement with the Institute of Public Affairs under authority of the Johnson-O'Malley Act. (Present funds will carry the program to July 1941.)

If these trainees demonstrate administrative ability, they soon pass into regular Federal employ, by meeting the usual Civil Service requirements. While this experiment has not continued long enough to yield conclusive results, it has demonstrated the feasibility of job-training for administrators. Another result of the training and testing program at Albuquerque during the past year has been a study covering about 1,000 administrative employees, principally in Oklahoma and in the Southwest. This study may result in the improvement of the existing efficiency-rating system now used in the Government. The study is also designed to test the efficacy of tests now used in recruiting new employees.

A third item of research, very important to the Indians, has been a study financed by the Public Administration Clearing House, dealing with the careers of Indians in the Indian Service. This study examines the selection of Indians for the Indian Service, their advancement in the Service, and the development of their abilities through improved in-service training. This study is nearing completion.

Other advances in Indian personnel work are the development of special examinations for the recruitment of Indian Service teachers, nurses, and extension agents, and the designation now being made at each jurisdiction of a worker who will be specialized in the procedures and problems of personnel.

COUNCILS OF FIELD ADMINISTRATORS

Significant progress was made during the past year in the organization and operations of councils composed of jurisdictional superintendents within seven important field areas. Founded in 1937, these councils have been developed in order that superintendents within a given area might share administrative experiences, exchange ideas, and enjoy the benefits of unity in common purposes and objectives. The areas in which the councils now operate are the Southwest, Intermountain, Northwest, Lake States, Dakotas, Oklahoma and Kansas, and Montana.

Such purposes are accomplished mainly by means of quarterly meetings and research studies conducted by each council group. The Southwest and Intermountain areas share the services of a full-time executive secretary, who is engaged in order that the meetings might be more productive, that technical assistance might be available for research in common administrative problems, and that the councils might have a liaison officer with the Washington office and the regional specialists. In other council areas, Indian organization field agents assist the councils during their meetings.

ARTS AND CRAFTS

Indian arts and handicrafts, long an intimate part of Indian life and culture, are also an important source of livelihood to the tribes. As a step toward fostering more profitable development of native talents, the Indian Arts and Crafts Board was established by act of Congress in the Department of the Interior in 1936 with the threefold purpose of educating the Indian craftsman in modern commercial methods, of expanding the market for Indian goods, and of protecting both the consumer and the Indian producer from cheaply imitated wares.

While the individualism of the Indian craftsman has been his principal asset in production, it has been his liability in marketing his product. Originality of design and execution give Indian arts and handicrafts their charm; but in selling his goods, the lone craftsman has been hard put to compete with the highly organized sales associations throughout the country.

One of the principal functions of the Arts and Crafts Board has been to teach the Indian modern commercial distribution methods without commercializing the product of his skill.

Preparatory to making definite recommendations to the various tribes on how their handicraft talents might best be utilized, it was necessary for the Board to survey every type of craft work still carried on among the Indian tribes of the United States and the natives of Alaska. It was imperative to know whether the various Indian prod-

ucts could be offered for sale in their traditional form, or whether they needed to be modified to satisfy the requirements of the buyers.

During the past year the findings of these surveys were crystallized in the publication of the book, *Indian Arts in North America*, by George C. Valliant, published by Harper & Bros. In its 52 pages of text and 96 plates, this book surveys North American Indian art from pre-Columbian times to recent achievements, describing concisely Indian origins and cultural differences.

The next problem was the commercial market. Last spring, contacts were made with merchandising experts and manufacturers to ascertain their reactions to quality Indian products as marketable merchandise. Articles shown included Choctaw and Cherokee fabrics, Navajo silver, moccasins and belts from the Plains Indians, ribbon-work from the Oklahoma tribes, and braided sashes from the Eastern Woodlands. The reactions of the merchandising experts were highly favorable and brought immediate orders, in spite of the fact that such orders were not solicited.

Since the volume of quality Indian products in all regions is still too small and too unstable to meet the large demands of most organized business houses, the Board could only carry back to the tribes the results of this inquiry as concrete proof of the existence of a demand and as a means of encouraging local agencies in their efforts to organize quality production.

In line with these efforts, preliminary outlines were prepared during the past year for the establishment of marketing organizations among the Navajo, Pueblo, and Seminole Indians. The Board also participated in the creation of a Community Arts and Crafts Center at Sells, Ariz., for the Papagos in southwestern Arizona. Through the use of tribal moneys and Indian Service rehabilitation funds, a building for the display and merchandising of arts and handicrafts was constructed with facilities for all retail and wholesale activities. With the assignment of a field worker to the Papago area, handicraft production is now under way in accordance with standards approved by the Board.

A second major effort of the Arts and Crafts Board has been to stimulate new outlets and new customers for Indian goods. Not only through sponsoring publications on Indian arts but also in the actual exhibit of authentic Indian goods and the demonstrations of present-day Indian techniques by Indians themselves has the Board discovered a rapidly expanding market for native craft talents.

At the Golden Gate International Exposition, San Francisco, Calif., the Board presented the largest exhibition of Indian arts and crafts ever assembled. The exhibit was made possible through the assistance of the United States Commission of the Fair, foundations, and private

individuals. The exhibit displayed the products of Alaskan culture areas and the seven principal Indian cultures in the United States: the Eastern woodsmen, the Plains tribes, the Northwestern fishermen; the California seed gatherers, the Navajo shepherds, the Pueblo farmers, and the Arizona desert tribes. In addition two model rooms were furnished entirely by Indian artisans. The complete exhibit occupied approximately an acre and a half and was seen by 1,500,000 visitors. In cooperation with a chartered Indian community of the Round Valley Reservation, Calif., a market was established for selling arts and crafts. Through the sale of their goods, Indians realized over \$16,000 during the Fair's first season, and over \$6,000 in wages for demonstrating native craft techniques.

The exhibit at San Francisco was closed October 29, 1939, to be opened again this summer. The Board's activities this year, however, were limited to the detailing of an employee to supervise the administrative work. A detailed and elaborate pictorial report of the exhibit, in the form of a microfilm, is now being prepared under a special grant from the Carnegie Corporation, New York.

The simplicity of line, strength of form, and absence of all extraneous matter in the two model Indian-decorated rooms at the San Francisco Exposition blended so naturally as an effective interior motif for modern homes that the Board was asked to prepare a similar exhibit for the Museum of Modern Art, New York City. Files of specimens and photographs have already been assembled and work undertaken on many reservations. This even larger exposition of Indian art in wood, ceramic, and textile is scheduled to open January 22, 1941.

Finally, the Board has carried forward its program of protecting buyers from spurious goods by issuing die-stamps or certificates of genuineness for all arts and handicrafts produced under conditions approved by the Board. The Government's seal of protection is available only to those Indian goods produced under conditions not resembling a workshop or factory system.

Navajo rugs, for example, have a label on a loose wire, sealed against tampering, which certifies that the rug was woven on hand looms from Navajo wool carded by hand. Silver jewelry from the Navajo and Pueblo country is die-stamped, indicating the name of the tribe which hammered and wrought the jewelry from slug silver.

During the past year, the Arts and Crafts Board has been preparing a system of trade-marks for quality products in the other less developed branches of Indian crafts. This trade-mark register will soon be available to all tribal groups who desire the protection of a Government guarantee of authenticity.

The sale of craft articles now provides a supplemental source of income for Indians, roughly estimated at about \$1,000,000 per year.

As the program advances, it is expected that Indian remuneration from arts and crafts production will increase manyfold within the next few years.

ALASKA

Alaska is a territory about one-fifth as large as the United States, with something less than 75,000 population. In this vast frontier area, a few hundred Indian Service workers and some 32,076 Eskimos and Indians are carrying forward a program of conserving the Territory's resources for future generations.

The problems of national defense have focused new interest on Alaska, for Alaska lies on the great circle route from the United States to Asia, and is an outpost of strategic importance. Here the experiences of the Indian Service may be of great value to the cause of national defense: the knowledge of terrain and climate, the existence of all-weather methods of transportation, and the amateur radio stations in outlying Indian Service posts are all assets which may serve national defense as well as they serve the cause of Indian rehabilitation.

The Indians and Eskimos subsisted on the fish and game of the northern latitudes. When commercial hunters destroyed the natives' food supply, whole villages were depopulated by starvation and disease. To insure a more reliable food supply for the northern part of Alaska, Congress in 1892 authorized the Office of Education to purchase and import reindeer for the support of the Eskimos. During the years that followed, the original 1,280 reindeer grew to almost a million head, but as they multiplied in number, they also passed from native to white ownership. Disputes arose between the original owners and the intruders over ownership, range control, and other questions inherent in the two different methods of exploitation. Under the stress of competition, the number of reindeer diminished and the range lands deteriorated, until the Eskimos were again faced with a shortage of food and skins.

In 1939, the Congress appropriated money for a census of reindeer, and allotted \$795,000 for the purchase of all reindeer not in native control. The census and round-ups were accomplished in a trimotored ski-equipped plane, assisted by native herdsman, and resulted in the acquisition of 84,001 reindeer, along with corrals and storage plants, at a figure \$275,000 less than the amount authorized.

The problem of the Indian Service now is to distribute the reindeer among the Eskimo villages on the basis of need, to teach the Eskimos scientific range management, to protect the herds from the depredations of marauding wolves increasingly prevalent in the reindeer country, and to assist in marketing byproducts not needed for native consumption.

Besides their value as food and clothing, reindeer provide the Eskimo a principal cash crop—fur clothing. During the past year, native craftsmen sold \$7,300 worth of mittens, caps, mukluks, parkas, trousers, and robes to the Byrd Antarctic Expedition. Native cooperative groups are now filling War Department orders aggregating over \$70,000 for fur clothing for the new garrisons to be stationed in Alaska.

Arts and crafts products are another important export. There are now some 120 dealers, 50 of them in the United States, handling such native products as dolls, wood carvings, ivory carvings, and baskets. Sales in 1939 totaled \$130,000, an increase of 40 percent over 1938; and 60 natives were employed as arts and crafts instructors.

Fishing is a major industry in Alaska, and although the natives along the coasts have followed fishing for hundreds of years, they too found their source of food threatened with the influx of white fishermen with their commercial methods of wholesale exploitation.

Now, however, under legislation similar to the Indian Reorganization Act, Alaskan natives may apply for charters of incorporation from the Federal Government, obtain loans for economic enterprises, and request that the Government set aside certain reserves for the exclusive use of the natives. Nine applications for this type of hunting, fishing, and grazing reserve have been received, and the Federal Government has made loans totaling \$459,650 to 12 native corporations for such purposes as establishing cooperative stores, storage plants, purchasing fishing equipment, and repairing boats.

One of the most hopeful steps toward independence and self-sufficiency has been made by the natives of Hydaburg, who built their own salmon cannery in 1939. During the first year of operation, natives caught and canned 41,236 cases of salmon and sales to date indicate they will easily meet their credit obligations. The cannery is managed by a nonnative, but the native owners expect to operate it themselves as soon as they are experienced enough.

Other native enterprises include the drying, smoking, and salting of fish at Elim and Unalakleet where outside markets have been located for disposal of local surpluses; the development of coal deposits at Point Hope and Unalakleet for local needs; and the conservation of wood at Shaktoolik and Stebbins for winter fuel.

TEACHERS HELP IN CENSUS-TAKING

In the task of enumerating the natives among Alaska's rugged, almost impassable mountains, rivers, and islands, the Bureau of the Census relied heavily on the assistance of Indian Service teachers and

field nurses. The Indian Service's operations bring it into contact with most of the native population the year round. Only an estimated 30 to 50 small native villages located in the most inaccessible regions, and which are impermanent in character, having a population of from 12 to 75 inhabitants, are without the services of the Office of Indian Affairs. Most of the teachers were thus able to assist in the census-taking along with their regular duties.

Indians and Eskimos reported in the 1930 census numbered 29,983. Preliminary tabulations place the present number at 32,076 on the basis of incomplete census returns. The natives are being classified into six linguistic groups: Aleutian, Eskimauan, Athapascan (including Dene, Timme, and Tinneh), Haidan, Tlingit, and Tsimshian; and three racial groups: Aleut, Eskimo, and Indian.

Aside from the decennial census, Indian Service teachers constantly perform many tasks outside the classroom, as they are often the only persons in the native community qualified to read English, interpret Government reports, and record data. A willingness for personal sacrifice, versatility, respect for the natives, and courage to meet the rigors of isolated climes are among the desired qualifications in the Alaska Service.

As the entire program of the Indian Service in the sparsely settled areas may revolve around a single Government employee, such as the teacher, four summer schools have been held during the past six years to study improvements in administration and clarify the problems of the particular Alaska communities in the light of the Federal program. In the summer schools, the Indian Service employee receives specialized training and demonstrations in the work of the Indian Service and related or cooperating agencies. The three R's can hardly be considered adequate training for assisting the natives toward self-dependence: the Alaska Service employee must take local responsibility for adapting the Indian program to his particular jurisdiction. This may entail setting up native governments to direct local affairs; borrowing funds for economic enterprises; stimulating the production and marketing of arts and crafts articles; demonstrating simple hygienic practices to improve health and living conditions; maintaining contact with other Federal agencies and the outside world; and supervising gardening, domestic relations, relief to the needy, recreation, cooperative store management, and the use of reindeer and other resources.

An increasingly important activity for teachers as well as other Alaska Indian Service employees, particularly in connection with the census-taking and reindeer round-ups, was the maintaining of daily radio communication; and, as part of their work, reporting

weather and landing conditions for the information of airplane pilots. Through special permission granted the Office of Indian Affairs in 1937 by the Interdepartmental Radio Advisory Committee, radio stations may be established in Indian Service schools and hospitals, without the issuance of licenses, for communication with each other and administrative headquarters through the Signal Corps System. Although the teacher must purchase and install at his own personal expense the radio equipment necessary for such a station, 42 stations have already been authorized to operate as Indian Service stations. These communication facilities are making the Alaska Indian Service more efficient and economical in saving lives and preventing accidents.

The Indian Service had in operation 115 small day schools, two boarding schools, and eight small hospitals. School facilities have yet to be provided for a third of the Indian and Eskimo population of Alaska.

Expansion of the educational and health facilities is underway with the construction of 4 new small community day schools, two 32-bed hospitals at Kanakanak and at Tanana, and accommodations for a dispensary and nurse's or physician's quarters at Nulato, Klawock, Tetlin, and Hydaburg.

In Alaska, as elsewhere in the Indian Service, natives receive preference in employment, and those having the necessary training are rapidly promoted and given permanent positions as soon as vacancies occur. Among the 205 teachers and 73 special assistants on the educational staff last year were 1 native principal, 27 native teachers, 10 apprentice teachers, and 13 native special assistants.

In all building, native labor is employed wherever possible with only a minimum of white labor.

Tuberculosis is still the most serious disease among the natives, and there is urgent need for establishment of a large tuberculosis sanatorium. Out of a total of less than 200 beds in the present eight Federal hospitals, only 32 beds are reserved for tuberculous patients. In addition to a sanatorium, new hospitals are needed particularly at Ketchikan, Seward, and in the Norton Sound region.

CIVILIAN CONSERVATION CORPS

Conrad L. Wirth, *Representative, Department of the Interior Advisory Council, Civilian Conservation Corps*

SIX bureaus of the Department of the Interior charged with responsibility for the protection of resources vital to the strength and defense of the Nation gave supervision during the year to Civilian Conservation Corps projects for the conservation of these resources and their development for the national welfare. In so doing they also contributed to the general program of rehabilitation and training of the young men enrolled in the C. C. C. An average of 485 camps operated under the Department during the year.

GENERAL LAND OFFICE CAMPS

Five camps assigned to the General Land Office worked under supervision of the Oregon and California Administration on projects for proper execution of the sustained yield forestry management of approximately 2,500,000 acres of revested Oregon-California Railroad grant lands in western Oregon. Conservation of the forest resources of these lands through fire protection and reforestation was a principal objective, while the corps also helped in efficient utilization of these resources. The whole sustained yield program in this area will be advanced through a C. C. C. road construction program making a large percentage of the area accessible, thus permitting the sale and removal of older and fire-killed timber to satisfy the demands of industry while leaving the younger and more thrifty growth to reach maturity and proper merchantable size.

Control of outcrop fires in valuable Federal coal deposits in Wyoming was continued under the supervision of the General Land Office in the Little Thunder Basin region. During the year, 13 separate coal bed fires were worked upon, 6 of which had been worked on previously. Three of these projects were definitely completed and work is progressing satisfactorily on the others. One fire of recent origin was taken out completely in 16 working days. There remain several other coal bed fires near Gillette upon which work must be done to prevent the destruction of this irreplaceable natural resource.

The operation of these General Land Office C. C. C. camps is

financially sound, because the cost of the camps will be returned many times to the Nation's wealth through increased protection, more efficient utilization, increased stumpage values, and conservation of forest values.

INDIAN C. C. C. PROGRAM

No section of the American people has received greater or more direct benefits from the C. C. C. program than the Indians. This program, in which thousands of them have been cooperating under the Office of Indian Affairs, has been one of conservation and protection of their own homelands on 71 reservations. Wages earned have provided Indians with current necessities of life and means for improving home conditions. The quality and standard of their work have improved. Safety and health have been emphasized both on the job and in the home. The C. C. C. has improved the mental attitude and physical condition of thousands of Indians who have had something to do and have given a fair day's work for a fair day's pay.

Basic structures for conservation of land and water and preservation of such resources as timber stands and forage cover have been undertaken under the C. C. C. program on the reservations. Water holes have been improved on Indian cattle ranges. Many dams constructed furnish water for livestock, refuges for fish, waterfowl, and animals; irrigation for subsistence gardens; and recreation. Ranges have been fenced. Much erosion has been prevented. New lookout towers, trails, and telephone lines have been built for the protection of resources from fire.

C. C. C. training among Indians has built up an important "second line" for national defense. For instance, more than 1,000 pieces of heavy mechanized equipment are operated and kept in repair by enrollees. More than 1,500 other automotive machines, trucks, cars, trailers, motor patrols, etc., are in continuous service on the projects. The Indians have built and are maintaining 7,000 miles of telephone lines. More than 8,000 miles of truck trails have been built and are being maintained, and more than 1,000 bridges have been constructed, involving important engineering training. A full program of first-aid instruction is being carried out. Experience in camp administration has been gained in the operation of 25 camps which house and board Indian C. C. C. enrollees.

Work in Reclamation

Valuable assistance in the program of the Bureau of Reclamation for the irrigation of millions of acres of western lands for agricultural use was given by the 44 camps allotted to this agency. Rehabilitation

of the distribution system of older reclamation projects continued to be the principal C. C. C. activity, although a large portion of enrollee time is being devoted to work related to the development of new areas and to experimental programs seeking to improve the conservation of water for irrigation purposes.

Most of the work on reclamation projects is of a construction nature, affording valuable training for the enrollees. Projects involve the building of many concrete water-control structures, lining of canals, clearing of reservoir sites, etc., requiring the operation of a fleet of trucks, tractors, scrapers, compressors, and similar mechanized equipment. The number of pieces of heavy equipment assigned to each reclamation camp is the second largest per camp assignment in the Department of the Interior. Operation and maintenance of this equipment under the difficult field conditions encountered on many reclamation projects and in coordination with the regular work programs is providing an unusual opportunity for the specialized training of hundreds of enrollees in a type of work fundamental to national defense.

An outstanding C. C. C. achievement of the year under Bureau of Reclamation supervision was completion of the Duchesne feeder canal diversion dam and headworks on the Moon Lake project in northern Utah. Another completed project included the raising of Clear Lake Dam on the Klamath project in Oregon. The Hackberry Draw flood-control project on the Carlsbad project in New Mexico, also was finished. Another accomplishment was the construction of the Elephant Butte fish hatchery on the Rio Grande Federal reclamation project in southern New Mexico. This project will be of great recreational value by providing fishing in a section remote from natural fishing areas. Other recreational areas developed during the year include those at Walcott Park at Minidoka Dam in southern Idaho; Alcova Reservoir on the Kendrick project in central Wyoming; and the Nelson Reservoir on the Milk River project in northern Montana.

Several heavy construction jobs were completed by the enrollees during the year, such as the building of the Alkali Creek inclined drop on the Shoshone project in Wyoming, involving production of 1,800 cubic yards of 6-inch concrete lining and 1,900 linear feet of 6-inch vitrified tile. On the Heart Mountain Canal on this same project, four large timber bridges were completed on the new operating road.

ACTIVITIES IN NATIONAL PARKS

During the fiscal year 90 camps were maintained in national parks and monuments, 198 in State, county, and metropolitan parks, and 22 on Federal recreational demonstration areas. Since the inception of

the C. C. C. there have been 198 camps established in 94 national park and monument areas in the continental United States, and 697 in 881 State, county, and metropolitan areas. In supervising this work the National Park Service has cooperated with 47 States, 35 counties, and 73 municipalities.

Camps were established for the first time in Badlands (S. Dak.) and Chaco Canyon (N. Mex.) National Monuments, Saratoga (N. Y.) National Historical Park project, and Kings Canyon (Calif.) National Park. Important historical restoration projects were carried on at Fort Pulaski (Ga.) and Bandelier (N. Mex.) National Monuments, Acadia (Maine) National Park, Shiloh (Miss.) National Military Park, and Colonial National Historical Park, Va.

Locations and plans for fire lookout towers were approved for seven National Park Service areas, and those in Shenandoah (Va.), Great Smoky Mountains (Tenn.), and Mesa Verde (Colo.) National Parks were completed. Preservation of archeological features and additional archeological reconnaissance work were continued at Ocmulgee (Ga.) National Monument.

Work accomplishments in areas of the national park system during the year included construction of 112.4 miles of fire breaks, tree and plant disease control work on 18,670.3 acres, the building of 72.1 miles of truck trails and minor roads, and 1,806 check dams. A total of 34,812 enrollee man-days was spent on 12,697 acres in the national parks of California for eradication of ribes for white pine blister rust control.

TRAINING IMPORTANT FEATURE

Enrollee training has been an important part of the C. C. C. program under National Park Service direction. During the year 95 percent of the technical personnel participated in both on and off the job training of enrollees, involving approximately 170,000 instructor-hours and 1,600,000 enrollee-hours. The fact that nearly 5,000 enrollees, most of whom possessed no special skills prior to joining the C. C. C., found jobs in private industry is largely due to this training.

Much importance was placed upon accident-prevention methods in the operation of trucks and other mechanical equipment, with a resultant reduction of 13 percent in the number of lost time and fatal accidents compared with the 1939 fiscal year, and nearly 18 percent reduction in the severity rate for the same period. Special emphasis was placed upon forest-fire protection by teaching the enrollee proper conservation practices, the proper handling and inspection of fire tools and equipment, and safe practices on the fire line.

NONFEDERAL AREAS BENEFITED

Camps were established on several non-Federal areas for the first time. Work on State, county, and metropolitan parks included projects for roads, picnic areas, and campgrounds, and facilities for swimming, hiking, camping, and similar activities. Important projects were also carried out for the protection and comfort of park visitors, such as water and sanitation systems, service and administration buildings, telephone lines, parking areas, fences, and guard rails. Historical preservation and restoration was also a feature of non-Federal area work.

Construction of a 200-foot log truss suspension bridge over the Spokane River was one of the outstanding C. C. C. jobs at Riverside State Park, Washington. In Watkins Glen State Park, New York, a smaller but equally useful bridge was built, in addition to fireplaces and picnic-ground development. Fifteen acres of beach were improved at Provo River Metropolitan Park in Utah and a vehicular bridge completed in the same area.

An archery range was built by enrollees in Brown County State Park, Indiana, where recreational use increased tremendously as a result of C. C. C.-built facilities.

To meet the increasing popularity of horseback riding, the Corps developed horse trails in 31 State, county, and metropolitan parks during the year. Outstanding were such projects in Moran State Park, Washington; the Akron Metropolitan Park system in Ohio; Clarence Fahnestock Memorial State Park, New York; and Cook County Forest Preserve District system, Illinois.

Four miles of entrance road and a 3-acre tent site were completed in Westmoreland State Park, Virginia. The Robert Fechner Recreation Area in Georgia, named for the first Director of the C. C. C., now deceased, was improved by the development of picnic grounds and shelters.

The C. C. C. contributed substantially to the continued development of Federal Recreational Demonstration Areas. Camps assigned to 22 of these areas worked on construction of buildings, utilities, roads, trails, swimming facilities, dams, and other projects for the safety and convenience of users.

IN THE TERRITORIES

In Territorial work, 675 enrollees were assigned to 5 projects in Hawaii, 225 additional enrollees were at work in Hawaii National Park, and 500 were assigned to jobs in the Virgin Islands. In addition, a 200-man company was at work in Mount McKinley National

Park, Alaska, during the summer of 1939. Territorial camps in Hawaii carried out tree planting and tree nursery work, as well as development of an experimental bird and game farm. In Hawaii National Park they constructed an underground telephone system and worked on planting and landscaping, removal of exotic plants, and erosion control. In the Virgin Islands, work included construction of minor roads, parking areas, fences, picnic areas, and telephone lines. Fire hazard reduction and field planting were also important projects, as well as eradication and control of undesirable animals. Good progress was made in landscaping of the service area and construction of necessary water and telephone lines and buildings at Mount McKinley National Park.

RANGE REHABILITATION ADVANCED

Excellent progress in a joint program for the rehabilitation of youth and the public range is reported by the Grazing Service. Construction and preventive programs designed to facilitate the control and use of lands under this Service were carried out in Utah, Nevada, California, Oregon, Idaho, Montana, New Mexico, Colorado, Arizona, and Wyoming.

Stock users generally acclaim the benefits derived from such physical improvements as wells, springs, fencing, corrals, truck and stock trails, and correlated activities which contribute to the conservation and preservation of forage coverage, such as rodent and fire control, and reclaiming measures such as erosion and flood control and watershed protection. Minor roads, trucks and stock trails, and water-storage improvements constructed primarily for stock purposes also can serve, with a little additional work on them, to facilitate travel in much of this semiarid area.

COOPERATE IN WILDLIFE CONSERVATION

Under supervision of the Biological Survey (which became the Fish and Wildlife Service on July 1, 1940) an average of 35 camps worked in 27 States from Maine to California and from North Dakota to Louisiana.

Development programs vary at each wildlife refuge, because of differences in water supply, climate, rainfall, and topography, although in the main the work was a continuation of previous activities. Projects included the construction of dams, dikes, levees, ditches, and other water-control structures, nesting islands, wildlife shelters, truck trails, bridges, lookout towers, fire lanes, telephone lines, headquarters, laboratories, and utility buildings, fences, and boundary markers; the planting of marsh and aquatic vegetation and of trees, shrubs,

vines, and soil-binding grasses; and other biological or engineering work necessary for the restoration, development, and efficient management of refuge areas. All such areas have been much improved and many have been transformed from biological deserts to refuges of great attractiveness to wildlife.

Of special importance was the work done on the Savannah River Refuge in South Carolina where the Corps began work in 1935. By the close of the 1940 fiscal year they had created 3,385 acres of excellent duck ponds with permanent dykes and control structures insuring stable water levels necessary for the abundant growth of food and cover. Refuge patrol has been facilitated by the erection of fences and boundary markers and the construction of roads and trails.

DIVISION OF TERRITORIES AND ISLAND POSSESSIONS

Rupert Emerson, *Director*

THE war in Europe and the continuance of the conflict between Japan and China brought an expansion of administrative activities by the Division of Territories and Island Possessions during the past fiscal year. With national attention focused upon all the Territories and possessions as points of vital strategic importance for the defense of these areas and of the continental United States, the Division cooperated fully with other Government agencies in providing facilities for such defense.

Alaska particularly has loomed as a potential point of invasion by air; as a consequence, the Division assisted in steps to provide protective Army and Navy bases which are being rushed to completion at various strategic points in the Territory.

Of particular significance to the defense of Alaska is the proposed legislation (S. 3577) strongly recommended by the Department of the Interior, which would make possible the organization of limited-dividend corporations to develop and colonize this sparsely settled Territory whose population averages only about one person to each 10 square miles. The proposed colonization program would provide a "defense behind the defense" in the form of manpower, in the case of actual combat, and an active population to furnish needed supplies to the regular troops which will be stationed in Alaska in connection with the new bases.

The Division also participated in coordinated plans for strengthening the military defenses of Puerto Rico, one of the bulwarks of protection for the Panama Canal, the establishment of a submarine base at the Virgin Islands as another link in the chain of Caribbean defenses, and the augmenting of preparedness measures in Hawaii, base of operations of the Pacific fleet.

During the year the Division continued its administrative functions of coordinating the Federal activities relating to Alaska, Hawaii, the Philippines, Puerto Rico, and the Virgin Islands; also the Alaska Railroad; Alaska Road Commission, the economic and social program of the Virgin Islands Co., and the colonization projects on Jarvis, Baker, Howland, Canton, and Enderbury Islands in the Pacific Ocean.



UNCLE SAM'S OUTPOST IN THE CARIBBEAN.

View of the harbor from Government Hill, St. Thomas, Virgin Islands, one of the far-flung portions of the United States under the jurisdiction of the Division of Territories and Island Possessions.

Rupert Emerson took office as Director of the Division of Territories and Island Possessions on June 24, 1940, succeeding Dr. Ernest Gruening, who was appointed and took over the duties of the Governor of Alaska, December 5, 1939.

ANTARCTIC SERVICE EXPEDITION

Considerable interest was aroused throughout the United States when the United States Antarctic Service Expedition sailed from Philadelphia on November 23, 1939. Prior to that time considerable work and effort was necessary not only by this Division but by other bureaus of this and other departments in order to assemble the necessary supplies and scientific equipment, and to assign personnel for the expedition. After some delay due to rigorous weather conditions in the south polar regions, two camps were established, one with 33 men at the West Base in January and the other with 26 at East Base in March 1940. The personnel at these bases will be engaged in many scientific observations, and, with weather permitting, in air-mapping large areas hitherto unexplored.

At the time the expedition was planned it was intended that the base camps would be maintained for at least a 2-year period in order to obtain the greatest amount of data possible. The Congress, however, appropriated only sufficient funds for the present fiscal year to evacuate the base.

TERRITORY OF ALASKA

During the year John W. Troy resigned as Governor of Alaska and was succeeded by Ernest Gruening, former Director of the Division of Territories and Island Possessions, who took the oath of office on December 5, 1939.

The 1940 census indicates an increase in population for the Territory from 59,278 in 1930 to perhaps 73,000 in 1940, an increase of over 23 percent.

At present the economy of Alaska rests largely on two industries, mining and fishing. Fishing is highly seasonal—for a few weeks each year—and its expansion is definitely limited by the need of conservation. Mining, too, rests preponderantly on one metal—gold. If the Territory's economy is to be securely maintained and grow, new activities and industries need to be developed.

One of the most obvious economic resources to be developed in Alaska is the recreational industry. Alaska is just beginning to appreciate the possibilities of this field and to think in terms of suitable accommodations for tourists and adequate facilities for their transportation.

Travel to the Territory increased considerably during the past year. Records of the 5 regular steamship companies serving Alaska show that 22 passenger ships and nine freighters carried 75,269 passengers in 1940 as compared with 68,065 the previous year. These figures do not include passengers transported by Government vessels during that time, or by vessels of the fishing interests operated during the canning season.

The principal revenue-producing industry, the fisheries, showed a decrease of \$7,450,534 in production for the year from that of the previous year. Poor packs of pink salmon in southeastern Alaska and in Prince William Sound were responsible for the sharp decrease in value from \$37,190,961 to \$29,740,427.

Mines in Alaska produced minerals worth \$25,296,000 in 1939, as against \$28,607,000 in 1938. The figure for 1939 is used instead of 1940 because records pertaining to mining activities are maintained on a calendar-year basis and the 1940 production figures will not be available until the end of December 1940. The following table shows the value of the mineral output of Alaska for 1938 and 1939.

	1939	1938
Gold.....	\$23, 279, 000	\$23, 170, 000
Silver.....	138, 000	307, 000
Copper.....	30, 000	2, 976, 000
Lead.....	106, 000	105, 400
Platinum metals.....	997, 000	1, 229, 300
Tin, metallic.....	37, 300	89, 100
Coal.....	585, 000	620, 900
Miscellaneous mineral products, including antimony, limestone, quick-silver, etc.....	123, 700	109, 300
Total.....	25, 296, 000	28, 607, 000

It will be noted that gold leads all other minerals in value. The value of the gold produced in 1939 was greater than in any other year in the entire history of the Territory.

A noteworthy advance was recorded in the value of fur skins from Alaska, being about a quarter of a million dollars more than the preceding year. The figure for the year was \$2,844,262.

Total shipments from Alaska to the United States declined by almost \$9,000,000 from the previous year, and shipments to the Territory by less than \$1,000,000.

The financial condition of the Territorial treasury is indicated in the following statement:

Net cash balance on hand, Jan. 1, 1939.....	\$877, 112. 82
Receipts.....	2, 845, 453. 68
Disbursements.....	3, 065, 880. 68
Net cash balance, Dec. 31, 1939.....	656, 685. 82

Aggregate banking figures for both national and territorial banks on June 30, 1940, were as follows: Capital, \$910,000; surplus and net undivided profits, \$1,250,339; deposits, \$17,148,552. Deposits show an increase of \$567,992 over the previous year.

THE ALASKA RAILROAD

The passenger train schedule of the Alaska Railroad in effect during the summer of 1939 provided for three round trips per week between Seward and Fairbanks, with supplementary service out of Fairbanks to Nenana and Mount McKinley National Park.

Passenger train service was reduced to one round trip each week in September, which schedule remained in effect until March 26, 1940, when one additional train was put on. On June 9, 1940, the summer passenger train schedule was again inaugurated consisting of three round trips per week between Seward and Curry; four round trips per week between Curry and Fairbanks with supplementary service out of Fairbanks to Nenana and Mount McKinley National Park, and out of Seward to Anchorage.

River boat service was maintained during the season of river navigation with biweekly sailings from Nenana to Tanana, Ruby, Holy Cross, and Marshall.

The number of rail line passengers carried amounted to 29,510 with a passenger revenue of \$264,715. Rail line freight hauled totaled 194,467 tons, with a freight revenue of \$2,311,152. The freight tonnage included 113,980 tons of coal. The total rail and river operating revenues were \$3,058,055; operating expenses were \$2,712,628. The total income in excess of expense amounted to \$341,663.

A new material warehouse was constructed at Anchorage replacing the warehouse lost by fire last year. Improvements and rehabilitation of track, bridges, and buildings continued throughout the year.

THE ALASKA ROAD COMMISSION

The work accomplished by the Alaska Road Commission during the fiscal year is summarized as follows:

New construction.—More than 19 miles of road, of which 11½ miles were surfaced, 53 miles of sled road, 360 linear feet of steel bridges of 60-foot span or over, 160 linear feet of steel trestle span bridges, 711 linear feet of timber trestle bridges and one 60-foot timber truss span.

Improvement.—A total of 47 miles of road regraded and widened, 121½ miles of road surfaced, 479 metal culverts averaging 20 feet in length installed principally as replacements for wooden culverts.

Maintenance.—More than 1,932 miles of road, 139 $\frac{1}{4}$ miles of tramway, 639 $\frac{1}{4}$ miles of sled road, 2,637 miles of permanent trail, and 240 miles of temporary flagged trail.

The cost during the year was \$944,822 of which \$240,766 was for new work and \$704,056 for maintenance and improvement.

ALASKA INSANE

During the past year 59 persons were admitted to Morningside Hospital at Portland, Oregon, where the legally adjudged insane from the Territory are cared for under contract with the Department of the Interior. During the same period there were 55 separations, leaving a net total increase in patient population at the end of the year of four patients. There was a total of 309 patients under care at the end of June, of whom 241 were males and 68 females.

TERRITORY OF HAWAII

Preliminary figures compiled by the Federal Census Bureau show that the population of the Territory was 422,860 on April 1, representing a 12.9-percent increase in the past decade. The Board of Health reported a decreasing death rate and an increasing birth rate during the year as compared to the previous year.

On adjournment of the 1939 legislature, it appeared likely a large deficit would ensue for the biennium on June 30, 1940, on the basis of estimated revenues and total legislative appropriations. However, tax collections during the year showed an excess over estimates, the result of improved business conditions. The Auditor reported that available cash on June 30, 1940, was \$2,956,294.74.

Total deposits in the 7 banks of Hawaii showed an increase of 9.7 percent for the year, while the gross assessed value of real and personal property in 1940 shows an increase of 3.747 percent.

Commerce figures continue to show a favorable balance for the Islands. Of the total amount of \$224,392,287 for the calendar year 1939, \$101,817,230 represented the value of shipments from the mainland United States to Hawaii, while \$113,206,898 represented shipments from Hawaii to the mainland. Imports from foreign countries were valued at \$7,479,248, while exports to foreign countries from Hawaii were worth \$1,888,911.

Sugar remained the primary industry of the Territory as far as valuation is concerned, shipments to the mainland having been valued at \$55,217,960, consisting of \$53,973,169 worth of raw and \$1,244,791 worth of refined sugar. Total value of pineapple shipments to the mainland was \$50,822,533 consisting of \$34,098,779 worth of canned pineapples and \$16,723,754 worth of pineapple

juice. Total value of pineapple exports to foreign countries was \$824,540, representing \$616,119 in canned pineapple and \$208,421 in pineapple juice.

Federal funds contributed considerably to the economy of the islands. Work Projects Administration activities in Hawaii during the year involved aggregate expenditures of \$1,972,641.39, and furnished an average monthly employment for 1,748 individuals. Expenditures of Federal funds for the operations of non-Federal projects amounted to \$433,298.54 of which \$405,809.34 was for labor and \$27,489.20 for materials, equipment rentals and other nonpersonal items. Work Projects Administration funds allotted to the Army and Navy Federal projects for the year amounted to \$564,159.98 and \$186,389.10, respectively, making a total expenditure of Federal funds in the Territory of \$1,183,856.62. In addition, sponsors contributed \$788,784.77 for labor, materials, equipment rental, making a grand total expenditure of \$1,972,641.39 for the W. P. A.-operated projects.

Total benefits of \$9,099,832 were paid to farmers in Hawaii for compliance with various conditions of the Agricultural Adjustment Administration. Under the Sugar Act of 1937, payments to 2,068 growers of sugarcane totaled \$8,975,614, which represented an increase of \$381,614 over the payments made in 1939, the increase being due to a larger production of sugar. Benefit payments to farmers under the soil conservation program amounted to \$121,404 and payments to rice growers were \$2,814.

Tourist travel to Hawaii established a new peak with 24,390 visitors in the calendar year 1939, in addition to 41,041 one-day tourists—through passengers en route to points beyond Hawaii—bringing the total of all arrivals, first and cabin classes, to 65,431. This showing was made notwithstanding the fact that travel to Hawaii was handicapped during the latter part of 1939 by a strike that closed the port of San Francisco and by the withdrawal from service of a number of foreign-flag liners.

A total of 90 Federal Credit Unions, with aggregate assets of \$2,069,679 were operating in Hawaii at the end of the 1939 calendar year and had made 47,170 loans to 14,210 borrowers totaling \$5,777,296. Loan losses of all unions since their inception in the fall of 1936 amounted to only \$1,385.21, or 0.024 percent of the entire amount loaned. The average share savings per member was \$67.63, while the average loan outstanding was \$124.

PUERTO RICO

The finances of the Insular Government continued in a satisfactory condition. The general fund, commonly termed "insular revenues,"

represents the collection of taxes and other receivables which, according to law, are available for the current operations of the Government. At the close of the year, the general fund showed a balance of \$2,853,331.75. This surplus resulted in large part from greater receipts than were anticipated from improved business conditions, the production and shipment of alcoholic beverages, and careful attention to disbursements in order that a program of reasonable economy might be followed.

Exports to the continental United States and to foreign countries amounted to \$90,902,156 and \$1,445,086, respectively, or a total of \$92,347,242. Imports from the United States and foreign countries amounted to \$100,517,184 and \$6,513,298, respectively, or a total of \$107,030,482. From these statistics there is an apparent adverse trade balance of some \$14,683,240 against Puerto Rico, but this is more than offset by importations made under the national defense program and of other Federal agencies, like the Work Projects Administration, by sugar and other agricultural payments made by the United States Department of Agriculture.

Although business conditions improved during the year there is still much unemployment due in part to the quota on sugar, the principal agricultural product of the island, and to the closing of needlework factories as a result of the Wages and Hours law enacted in 1938. The sugar quotas were suspended by Executive order on September 11, 1939, and this action was of great benefit to the sugar industry, as all of the Island's surplus sugar was exported before the quotas were reestablished. An amendment was obtained to the Fair Labor Standards Act (Public No. 88, 76th Cong., approved June 26, 1940) providing for the appointment of industries committees to recommend the minimum rate or rates of wages to be paid in Puerto Rico. A committee has been appointed to investigate conditions pertaining to the needlework industry and it is hoped that it may be found feasible to establish a rate of pay which will not compete with wages in the continental United States, but which will permit a resumption of that industry, and the reemployment of the thousands of Puerto Ricans thrown out of work by the passage of the Fair Labor Standards Act.

Preliminary census figures indicate that the total population is now 1,871,438. This is an increase of 21.07 percent in the population during the past 10 years.

Considerable progress, under the provisions of Public Resolution No. 60, Seventy-fourth Congress, approved August 27, 1935, has been made in adjusting the hurricane relief loans made by the former Puerto Rican Hurricane Relief Commission from 1929 to 1933, inclusive. Loans adjusted to June 30 number 222. The total sum accepted

in adjustment was \$295,752.52. Approximately 29.69 percent of these original loans will be recovered. These adjustments entail a great deal of work, as they are approved on the basis of the ability of the borrower to pay, and not on a horizontal reduction scale.

William D. Leahy, a retired Admiral of the Navy, succeeded Maj. Gen. Blanton Winship as Governor of Puerto Rico on September 11, 1939. The President also appointed Guy J. Swope as auditor and George A. Malcolm as attorney general. They qualified for their respective offices on November 27, 1939, and February 7, 1940.

VIRGIN ISLANDS

The outbreak of the present European War presaged evil for the Virgin Islands, especially the Island of St. Thomas. One of the chief sources of revenue for the city of Charlotte Amalie is derived from the sale of commodities of various kinds to the many tourists visiting the islands. Ships of foreign registry had many cruises scheduled for St. Thomas, but these were canceled at the outbreak of the war. The effect of the war on the Virgin Islands' tourist trade was brought into sharp focus with the sinking of the *Athenia* in September 1939, as that ship was among those scheduled for several trips to the Islands.

However, the loss in tourist revenue from foreign ships has been partially compensated for by scheduled cruises of ships of United States registry, especially the new liner *S. S. America*.

The Virgin Islands Cooperative conducts a thriving business as each ship calls at Charlotte Amalie. As an example, the *S. S. America*, has been bringing into the port on each cruise between eight and nine hundred visitors whose average expenditures total slightly over \$1 per person, or approximately \$1,000 of trade for a single day's stop.

During the greater part of the year, there was marked unemployment in the islands. This situation was relieved in St. Thomas by the initiation of projects in connection with national defense. Funds have been made available for the preparation of a submarine base and enlargement of the marine air base facilities on the Island of St. Thomas. There is also under consideration a proposed air landing field for use of the army on the Island of St. Croix.

The general agricultural economy of the island of St. Croix, however, has been at a low ebb for the past three years due to a severe drought, which continued during 1940. As most of the revenue for the farmers on the Island of St. Croix, and in fact practically the entire population, is derived from the sale of sugar cane, the effects of the continued drought are especially disastrous.

Federal funds to the extent of approximately \$400,000 from appropriations made to the Work Projects Administration were made avail-

able to the Islands in 1940, for a large variety of projects, including highway and street improvements, preparation of lunches for school children, improvements to sanitary and water facilities, eradication of cattle ticks, etc. One project of importance to the Islands provided for a survey of the population for leprosy.

A total of \$240,000 in Public Works funds was made available for the construction of an abattoir on the Island of St. Croix, as an aid to the cattle industry, and for the construction of a public market in Charlotte Amalie.

THE VIRGIN ISLANDS CO.

That the activities of the Virgin Islands Co., cover a wide variety of endeavors is evidenced by the following: it grows and buys sugar cane for the manufacture of raw sugar and sells this sugar to United States refineries; it manufactures and sells "Government House Rum" for sale in the United States, Hawaii, Alaska, and the Virgin Islands; it manufactures and sells a special distillate to a concern in St. Thomas for the making of bitters; it has a poultry farm and sells chickens and eggs in St. Croix and St. Thomas; it crushes rock and sells this to the Government for the construction of St. Croix roads; it rents tractors, farm equipment, land, trucks, and other equipment to the people of St. Croix; it sells cane seed; it does general repair work at its machine shops; and it sells cattle and milk. It sells alcohol to the Government hospitals. It transacts business with the Federal homesteaders and the Federal Homestead Authority.

Raw sugar represents about 60 percent of St. Croix's exports and the sugar quota for the Island established by the Sugar Act of 1937 amounts to only thirteen ten-thousandths of the United States consumption. Rum makes up about 35 percent of the Island's exports; and this same rum is estimated to be less than 4 percent of the United States' consumption. In other words, raw sugar and rum together represent close to 100 percent of the exports from St. Croix, and these same articles are almost unnoticed in the United States consumption.

The raw-sugar business is the only business to which people can look for employment, and the internal revenue tax on rum is the only income the municipal government (St. Croix and St. Thomas and St. John) might secure to balance its budget without continually and annually appealing to Congress for deficit appropriations as is the present practice.

The Virgin Islands Co. has in four years made the following important contributions to St. Croix economic rehabilitation:

1. Employed directly 1,000 persons, which is 20 percent of the Island's laborers. This indirectly has given employment to about 15 percent more of the Island's laborers.
2. Improved the laborers' pay, housing facilities, sanitation, provision gardens, and community centers.
3. Reestablished bankrupt properties and put them to economic use to create commerce in sugar and rum and pay about \$35,000 per year in taxes to the local government.
4. Furnished a steady market for 700 small growers and federal home-steaders with mill capacity to take care of more than four times as much cane as they can grow.
5. Reestablished a rum business which pays \$136,000 per year in internal-revenue taxes.
6. Rents modern tractors and farm equipment and sells the best varieties of cane seed to the small grower.
7. Brought a new manufacturing business to St. Thomas by contract.

The progress of the Virgin Islands Co. in reestablishing a sugar-cane and sugar-cane-products industry is indicated by the following analysis of sales:

Gross Sales and Miscellaneous Income for Year Ended June 30

	1935	1936	1937	1938	1939
Raw sugar.....			\$101,820.16	\$195,335.60	¹ \$75,607.01
Government House Rum.....	\$954.81	\$8,609.50	92,984.71	106,351.13	88,436.66
Special distillate.....			1,532.58	11,435.74	14,364.71
Tomatoes.....	170.79	2,624.12	4,979.65		
Other income.....	1,797.60	42,386.15	20,372.30	31,375.70	23,350.47
Total.....	2,923.20	53,619.77	221,689.40	344,498.17	201,758.85

¹ The severe drought of 1939 became worse in 1940. Many fields of sugarcane have died and are still dying.

The Island of St. Croix is the largest of the Virgin Islands group and its 15,000 inhabitants depend almost entirely upon the cultivation of sugarcane and the processing of raw sugar and rum for a livelihood. The cotton business was wiped out by the pink bollworm. Ventures in tomatoes, citrus fruits, sisal, tobacco, cocoa, coffee, and onions proved to be without economic success and were discontinued. However, the cattle business and the rum industry have survived and seemingly have permanent places in the economic structure. The 939 growers of sugarcane come under the restrictive provisions of the Sugar Act of 1937 which subject their sugar to the quota and processing taxes, but Congress did not extend the benefit-payment provisions of the act as an offset. Unlike growers in Hawaii, Florida, Puerto Rico, Louisiana, and the other sugar areas, the St. Croix grower is the only one

under the American flag so discriminated against. In addition, he pays an export tax of \$6 per ton on all the raw sugar shipped to the United States and is the only American citizen required to pay a tax on goods for interstate commerce as the wages and hours legislation which was extended to the Virgin Islands defines these sugar shipments.

It is essential that remedial legislation be enacted by the Congress to (1) make it possible for the grower of sugarcane to earn a living by his own labor and gradually replace the hundreds who are now on the relief rolls, and (2) make available to the treasury of the Virgin Islands the revenues from the internal revenue taxes collected on articles of Virgin Islands manufacture. This latter legislation would enable the island legislators for the municipality of St. Croix and the municipality of St. Thomas and St. John to derive revenue from the growth and products of their own communities, for the costs of their schools, hospitals, institutions, sanitation, and police, as other island possessions have been authorized to do. It would at the same time end the unworkable system of municipal deficit appropriations which have been made annually by the Congress ever since the United States Government acquired the Virgin Islands in 1917.

THE PHILIPPINE ISLANDS

Following the resignation of Paul V. McNutt, the President on August 2, 1939, appointed Francis B. Sayre, formerly Under Secretary of State, as High Commissioner of the Philippines.

The recent census showed the population of the Philippines to be 16,000,303 on January 1, 1939. In 1918 it was 10,314,310.

An amendment to the Independence Act, passed by the Congress August 7, 1939, exempts certain Philippine products from the export tax provisions of the Tydings-McDuffie Act, and imposes in lieu thereof a diminishing export quota effective as of January 1, 1940. No modification was made in the provisions of the Independence Act which imposed export taxes, to become effective January 1, 1941, on sugar and all other Philippine products shipped to the United States not expressly exempted therefrom. The amendment also provides for a joint conference to be held at least two years prior to July 4, 1946, for the purpose of formulating recommendations as to trade relations between the United States and the Philippine Islands when the islands shall have become independent.

The external trade of the Islands during the calendar year 1939, not including gold and silver, amounted to \$243,993,862. Shipments from the United States to the Islands were valued at \$83,427,853 in 1939, placing the Philippines in fifth rank as a customer, preceded only by

the United Kingdom, Canada, Japan, and France. Philippine shipments to the United States were valued at \$92,131,525.

At the present time, the Commonwealth government is in excellent financial condition. However, the matter of adjusting the Islands' economy as contemplated in the Independence Act, to a position independent of free trade with the United States, presents a most serious problem for the future.

In addition to the changes in the economic system of the Philippines which will be brought about by the Independence Act, world conditions caused by the war have already seriously disrupted foreign markets for Philippine products and the supply of ocean-going vessels to carry such products. It is well recognized in the Philippines that these problems will bring about widespread changes and they are being given serious consideration by Commonwealth officials.

A large part of the revenues of the Commonwealth government is derived from the refund of excise taxes collected in the United States. Congress requires that these funds be separately budgeted and accounted for and used for the purpose of preparing the Philippines for the responsibilities of independence. Reports from the United States High Commissioner indicate that the Commonwealth government is making an earnest effort to utilize these funds as required by Congress.

One of the principal functions of the Division of Territories and Island Possessions, insofar as the Philippine government is concerned, is to exercise general control and supervision over Philippine bonds and currency reserve funds for the purchase of bonds, payment of interest, and purchase of supplies.

During the year ended June 30, 1940, payments in total amount of \$8,483,904.02 were made from funds of the Philippine government. Of this amount \$2,220,338.27 was for supplies purchased in the United States and shipped to the Philippines, \$3,190,431.75 was for the purchase of Philippine bonds, \$2,567,555.00 was for interest on the Philippine public debt, and the remaining \$505,579.00 covered payment of salaries and expenses of Philippine personnel in the United States, pensions to retired Philippine employees, and for other miscellaneous purposes.

The Division, working closely with the Resident Commissioner from the Philippines, has endeavored to combat any legislation which would militate against Philippine interests. Bills continue to be introduced which discriminate against the rights of Filipinos in the United States as to employment, etc., on the ground that they are not citizens. The policy of this Department has been to endeavor to secure in the United States during the Commonwealth period

the same treatment for Filipinos that is accorded American citizens in the Islands.

Bank suits.—When the functions of the Bureau of Insular Affairs of the War Department were transferred to this Department there were a number of bank suits pending in the courts in connection with Philippine deposits that had been paid in full from the collateral furnished the Chief of that Bureau by the banks. These suits, inherited by this Department, were finally disposed of on March 25, 1940, when the United States Supreme Court decided that the action of the War Department and its officials had been in accordance with the law.

National Assembly of the Philippines.—The year 1939 was remarkable for the volume of domestic legislation and for the number and importance of laws which markedly affected business and finance. Nearly 100 measures were passed and approved during the year.

Among the more important of these were the immigration bill, approval of amendments to the Philippine Constitution, the general appropriation bill, providing for the expenditure of coconut oil excise tax refunds for the fiscal years 1940 and 1941, declaring Tagalog an official language in 1946, creating a National Coconut Corporation, a National Tobacco Corporation, a Bureau of Immigration, and a Department of Health and Welfare in the city of Manila. A measure amending the Internal Revenue Code, passed at the previous session, and the recent immigration bill require approval by the President of the United States before becoming law. The latter establishes a quota of 500 immigrants annually for each foreign nationality. The United States Immigration Act of 1924 was not applicable to the Philippines.

The following proposed amendments to the Constitution were submitted to the people at a plebiscite held on June 18, 1940:

1. Reduction of the tenure of the President and Vice President from six years, without reelection, to four years, with one reelection.
2. Establishment of a bicameral legislature through revival of the Senate, to be composed of 24 members at large, and increasing salaries of members of the legislature.
3. Establishment of a Commission on Elections which shall take charge of the conduct of all elections.

All amendments were approved by the people in a plebiscite held on June 18, but at the end of the fiscal year had not been formally submitted to the President of the United States.



NEW OPPORTUNITIES FOR PUERTO RICANS.

Finding new ways for improving economic conditions in the Island is one of the conservation problems tackled by the Puerto Rico Reconstruction Administration. Upper: Curing vanilla beans under the program for establishment of this new industry. Lower: Chicken raising on ranches like these is another new commercial development.

PUERTO RICO RECONSTRUCTION ADMINISTRATION

William D. Leahy, *Administrator*

DURING the fiscal year ending June 30, 1940, the Puerto Rico Reconstruction Administration continued its broad rehabilitation program, chiefly rural, designed to afford employment and to help the Puerto Ricans help themselves. So far as the legal restrictions on availability of relief money permitted, the Administration continued its search for practical solutions to some of the basic Insular economic and social problems, through the medium of demonstration projects undertaken on a small scale under competent leadership. New opportunities were created for individual betterment through providing rural people with hurricane-proof dwellings, small parcels of land for the cultivation of cash and subsistence crops, agricultural and marketing advice, instruction in the control of soil erosion, etc.

Funds were derived principally from \$7,000,000 appropriated by the Emergency Relief Appropriation Act of 1939, together with balances of approximately \$575,000 reappropriated from the Emergency Relief Appropriation Act of 1938 and \$1,290,930 available from the Puerto Rico Special Fund for obligation in 1940; and \$122,500 allotted out of the Puerto Rico Revolving Fund. The funds available during the fiscal year ending June 30, 1940, were obligated for the following purposes and amounts:

Rural rehabilitation-----	\$3, 268, 970
Engineering, including construction for rural rehabilitation-----	3, 171, 878
Rural electrification-----	1, 031, 940
Forestation-----	227, 100
Loans and assistance to farmers and cooperatives-----	701, 912
Housing management-----	122, 500
Administration-----	451, 460
Miscellaneous items-----	12, 670
Total obligated-----	\$8, 988, 430

By Executive Order of November 30, 1939, the Honorable William D. Leahy, Governor of Puerto Rico, was designated Administrator to succeed the Honorable Harold L. Ickes, Secretary of the Interior, who had resigned.

RURAL REHABILITATION

Recognizing that the economy of Puerto Rico is fundamentally agricultural, the P. R. R. A. has devoted most of its efforts to relief and rehabilitation in distressed rural areas. To this end it has functioned through units for land utilization, soil conservation, medical service, tick eradication, agronomy and marketing and livestock development. Necessary construction work incident to this broad program has been supervised by the Engineering Division.

Land utilization.—In each of the large resettlement developments is a central service farm from which the operations of the resettlers' farms, proper methods of cultivation, harvesting and marketing, and improved practices in breeding and distribution of poultry and livestock are demonstrated and supervised. Continued encouragement has been given to the planting of onions, which previously were almost entirely imported. During the fiscal year about 50 acres were planted by 200 resettlers producing 3,000 cwt, of which half was sold in local markets. Similarly, farmers have been encouraged to continue planting of vanilla, resulting in increased cultivation of 137 acres. Last year the P. R. R. A. vanilla curing plant received 2,905 pounds (now being cured) as against only 573 pounds of green beans the previous year. Last year's production brought \$5 a pound in the New York market, indicating the value of this crop, when properly developed, as a source of increased income for the Island.

Livestock and poultry.—The P. R. R. A. continued its program of improving the swine stock of the Island, so as to supplant the native breed with a more economical animal.

From the herds at the central service farms Castaner, La Plata, Vieques, and Zaldondo, 3,084 pigs were farrowed this year, of which 1,204 were distributed among resettlers, and 883 sold to farmers interested in the Hampshire and Duroc breeds. These pigs were all produced from pure-bred hogs imported from continental United States. The success of the work is indicated by the fact that this year twice as many pigs were distributed to resettlers, and four times as many pigs were sold to other farmers, than during the fiscal year 1939.

The poultry program, like the swine program, was initiated in 1937 with the aim of fostering a better breed. Although a mortality rate of from 25 to 50 percent must normally be expected in Puerto Rico, the Administration has succeeded in acclimating the New Hampshire Red breed. The breeding plant previously constructed at the central service farm at La Plata was continued in operation this year, producing 10,733 baby chicks, bringing the total produced to date to about 37,000 chicks. Of the production this year, 5,169 at eight weeks of age were distributed to the Administration's resettlers. An additional 4,707 were sold at broiler age to the public through auction.

Tick eradication.—The program to eradicate the fever tick in Puerto Rico was undertaken in 1935 as part of the original P. R. R. A. rural rehabilitation program. It has been financed exclusively with P. R. R. A. funds, in cooperation with the Department of Agriculture and Commerce of the Insular Government and the Bureau of Animal Husbandry of the United States Department of Agriculture. The program was designed to improve the grade and health of livestock so as to provide more and better milk and meat.

As has been stated in previous reports, the Island was divided into three zones, namely, western, middle and eastern. These zones were separated by established quarantine lines. At the present time, only one quarantine line is being maintained.

During the fiscal year 1940, the vat construction program was completed. A total of 154 vats was constructed in the eastern zone bringing to 1,126 the total number of vats constructed for the entire program.

Systematic dipping work was completed in the middle zone in January 1940, at which time dipping was undertaken in the eastern zone where approximately 170,000 heads of livestock are dipped every 14 days. Work has been completed in the western and middle zones.

The entire program will be completed in the fiscal year 1941, when it is expected that an additional allotment of \$200,000 will be made. With these additional funds, the systematic dipping work will be completed in the eastern zone by the end of January, after which a final cleaning-up program will be conducted over the entire Island between that time and June 1941.

Up to the beginning of the present year, a total of \$1,096,950 had been allotted for this program, and an additional \$459,450 was allotted this year, bringing the total allotment to \$1,556,400. The total cost of the program will be approximately \$1,756,000.

Loans to needy farmers.—As part of its program of rural rehabilitation and relief the P. R. R. A. two years ago started making small loans to needy farmers, for the purpose of raising crops and purchasing poultry and livestock. During the year just ended \$478,693 was loaned to 1,571 borrowers, as compared to \$211,221 loaned to 661 borrowers the previous year. As of June 30, 1940, 73.07 percent of the principal had been collected. The credit risk in loans of this type is not considered desirable by ordinary lending agencies. While the Government will sustain some losses, it is to be borne in mind that grants rather than loans could legally have been made; and that through these loans substantial betterment of the economic condition of many of the borrowers has been realized.

RURAL SANITATION AND HEALTH

The Rural Sanitation and Health Section confined its activities, as its name implies, to rural areas. The work, involving a con-

tinuation of previous programs of providing instruction in sanitation, health conservation, and preventive medicine, was carried out through the operation of 17 medical dispensaries at P. R. R. A. resettlement projects located in 14 municipalities in the Island.

The organization consisted of a central office and the 17 dispensaries, each staffed with a physician, nurse, sanitary inspector, clerk, and a janitor.

The services included visits and treatments to resettlers and their families at the various projects, analyses for water contamination, oilings for mosquito elimination, inspection of homes for sanitation defects, and other miscellaneous services. The central dispensaries also handled injury compensation work cases for the entire Administration.

Some of the accomplishments for the year were: 6,793 physical examinations; 1,146 clinics held; 86,519 visits to clinics by patients; 24,394 dressings made; 8,278 cases attended by nurses; 27,445 prescriptions written; 22,931 home visits made by nurses and physicians; 7,658 persons inoculated for typhoid and smallpox; 6,167 persons treated for malaria; 73 persons, in 350 treatments, treated for syphilis; 1,773 miscellaneous treatments; 76 persons treated by a specialist for rare diseases; 3,500 treatments for intestinal parasites; 6,422 oilings for mosquito destruction; 5,295 sanitary inspections at homes; 8,214 injections administered; and 817 injury compensation cases attended, involving 3,353 dressings and other treatments.

Obligations for the year totaled \$80,643 for the entire program.

SOIL CONSERVATION

During the year the demonstration of soil-conservation practices and land utilization was inaugurated in three new areas on Federal lands: Juan Domingo near Arecibo, Las Cuevas near Trujillo Alto, and in the San Sebastian region. Work in two of these new areas was completed during the year, in addition to the completion of seven areas of work commenced in prior years: Cayey, Mayaguez, Arroyo, Luquillo, Castaner, San Just near Trujillo Alto, and Vieques.

Funds were provided to carry out demonstrations on lands of private farmers, the same type of program as followed on Federal property, in cooperation with the Insular Agricultural Extension Service and other allied agencies. Work was conducted on five areas near Juncos, Coamo, Mayaguez, and Sabana Grande. As a result, a much larger number of farmers than heretofore received instruction and demonstration in proper soil-conservation practices, such as contour tillage, strip cropping, crop rotation, barrier strips, hill-side ditches, etc.

The intensive research projects looking toward development of improved methods of soil conservation were continued throughout the year with assistance of P. R. R. A. funds, in cooperation with the Federal Experiment Station at Mayaguez and the Insular Experiment Station at Rio Piedras. In addition, technical assistance was furnished to the P. R. R. A. Forestry Division in carrying out soil erosion control practices on the forest homesteads ("parceleros") on the Federal lands.

Briefly, some of the accomplishments during the year just ended were: 332,102 lineal feet of outlet channels protecting 2,843 acres; 173,882 lineal feet of diversion ditches protecting 878 acres; 234 lineal feet of hillside ditches protecting 765 acres; 137 miles of ridge terraces protecting 889 acres; 315 individual terraces protecting 384 acres; 526 miles of vegetative barriers protecting 1,204 acres; gully control, contour tillage, and strip cropping on 1,153 acres; and 102 miles of contour furrows protecting 340 acres.

In all, around 500 acres of land were worked on during the year. Employment given to workers and technical personnel averaged around 1,900 for the year, with a peak at one time of 3,000.

COORDINATED ACTIVITY WITH OTHER FEDERAL AND INSULAR AGENCIES

Since the fall of 1938 the P. R. R. A. has had a definite coordinated program designed to augment the existing inadequate facilities of the other agricultural agencies operating in the Island, to expand their research and development functions, and to make the best possible use of P. R. R. A. funds available for such work. Close cooperation has been maintained with both Federal and Insular agencies concerned with the agricultural problems of the Island. Examples of such cooperation during the fiscal year just ended were:

Insular Department of Agriculture and Commerce.—To aid in the development of a subsistence planting program, the P. R. R. A. spent \$24,000 principally in the employment of 22 agricultural agents, who supervised the planting of subsistence crops to provide work and food for needy persons on about 21,000 acres of private lands donated for such use by public-spirited farmers and sugar mills. It is estimated that more than 16,000 workers were benefited by this program.

Insular Agricultural Extension Service (University of Puerto Rico).—The P. R. R. A. provided technical personnel, at a cost of \$75,000, to work with the Director of Extension in continued development of the soil-conservation program, in investigating applications

for production loans made by the P. R. R. A., and in advising farmers in livestock and poultry development, growing of subsistence crops, farm management and marketing problems, 4-H Club activities, and the like. Home demonstration agents paid by the P. R. R. A. made over 17,000 visits to 8,300 homes; about 1,400 meetings were held; and progress in diet and food conservation was made by canning thousands of jars of fruits and vegetables at the P. R. R. A. canning centers.

With \$5,000 provided by the P. R. R. A. for technical personnel and materials, the Department of Botany and Pathology of the College of Agriculture of the University of Puerto Rico was enabled to continue important research on vanilla culture and the control of pests which threatened development of this prospectively important source of agricultural income. The Insular Experiment Station, with \$21,000 from the P. R. R. A., continued important experiments, with the cooperation of the School of Tropical Medicine, in proper feed for hogs and investigation of parasites in calves and horses. Important work was done in selection of sea-island cottonseed with a view to improving the grade of cotton produced in Puerto Rico. Also, with \$8,000 allotted by the P. R. R. A., the Tobacco Institute continued studies and experiments, particularly in the resistance of imported cigarette tobacco to disease and the identification of various tobacco diseases.

Federal Experiment Station (Puerto Rico Experiment Station of the United States Department of Agriculture).—Valuable experimental work started last year on bamboo, vanilla, spices, perfume, and medicinal-plant culture was again financed by the P. R. R. A., with \$26,275 for technical personnel, labor, and materials. Outstanding results are indicated from the propagation of species of bamboo, believed to be an industrially important product for Puerto Rico, and in the possibilities of an emergency supply of quinine.

COOPERATIVES

The P. R. R. A. worked during the past year with 16 cooperatives, including 3 newly organized. Valuable cooperation was extended by the Agricultural Extension Service, the Insular Department of Agriculture and Commerce, the Insular Department of Education, and the Federal and Insular Experiment Stations.

Lafayette Sugar Cooperative.—Operations of the Lafayette Sugar Mill Cooperative were satisfactory. During the year it produced 236,485 bags of sugar of 250 pounds each from 249,095 tons of cane. The average sugar yield from cane ground was 11.867 percent, as against 12.794 average for the 1939 season. This decrease was due partly to the grinding of overmature cane that was left over from the 1939 season because of then-existing quota restrictions and partly to a

prolonged drought. Despite the lower sugar yield and the increase in hourly wage rates from 25 to 30 cents under the Fair Labor Standards Act, the mill accomplished a reduction in manufacturing costs.

Unfortunately, the 12 land cooperatives, to which sugar lands were sold on credit by the Government, have not experienced like success and will have to be liquidated.

The members of these land cooperatives have authorized reconveyance of their holdings to the Government for credit at the fair value thereof on their mortgage obligations to the Government, and this reconveyance is now in process of being consummated. It is planned to subdivide the lands into relatively small parcels, each with a sugar quota, and to sell them to small experienced sugarcane growers. Thereby the investment of the Government will be safeguarded, the fundamental objective of the project for more equitable distribution of lands still will be realized, and laborers in the area will be assured of more employment than they were likely to have from the failing cooperatives.

The construction of a plant by the mill cooperative, with a loan of \$550,000 from the P. R. R. A., to provide facilities for experimenting with the conversion of cane byproducts into solvents such as butyl alcohol and acetone, has been completed. The plant, now in full operation, has a capacity for converting annually 2,500,000 gallons of molasses into 5,000,000 pounds of mixed solvents. Not only will this plant produce byproducts as an offset to quota restrictions limiting the production of raw sugar, but such products should also be of exceptional value in case of war.

Los Canos Sugar Cooperative.—The purchase in March 1939 of the other sugar-mill property, Los Canos, was financed by a P. R. R. A. loan of \$619,000 to a cooperative over 90 percent of whose members are needy farmers. No land purchases were involved, outside of the 42 acres immediately surrounding the mill. The cooperative members individually own or lease some 8,000 acres of land in the mill area. An additional loan of \$200,000 was made to this cooperative just before the close of last year for improvements, principally in machinery to increase production capacity. These improvements have now been made. Additional loans during the year just ended totaled \$110,000 for purchase of equipment and operating expenses. During the 1940 grinding season, Los Canos produced 152,713 bags (250 pounds each) and 26,570 bags (100 pounds each) of raw sugar from 186,190 tons of cane. The average yield of sugar per 100 pounds of cane was 11.066, a decrease (for the same reason as in the case of the Lafayette mill) of 0.745 percent from the 1939 season average.

Vegetable cooperatives.—The four vegetable cooperatives are producing winter vegetables, such as tomatoes, cucumbers, peppers, and string

beans, principally for the New York market. These cooperatives increased the total Island export of tomatoes from 9,381 lugs last year to 33,388 lugs during the present year, an increase of 356 percent. Gross receipts of the four cooperatives totaled \$124,654, and each operated at a profit. In one cooperative, individual members sustained losses due to sudden vegetable blights. Most of the members received a net profit equal to production cost. Some even trebled their investments. A Puerto Rican farmer under P. R. R. A. guidance in April of this year established a record price for tomatoes on the New York market when he received \$8.40 for a lug of tomatoes. Three of the four vegetable cooperatives were granted small operating loans during the past year, totaling in all \$17,000.

Vanilla cooperative.—The vanilla growers' cooperative, an outgrowth of encouragement given to growers by the P. R. R. A. through production and distribution of vanilla cuttings to growers on a loan basis, instructions in growing, and the construction of a pilot plant for curing vanilla, is marketing vanilla for its members. The cured vanilla beans marketed by the member-growers last year amounted to only 140 pounds, whereas this year the cooperative will probably market 800 pounds.

Other cooperatives.—The Puerto Rico Marketing Association for Minor Crops, producing sea-island cotton, increased its total sales from \$64,587 in 1938 to \$128,367 in 1939, and it is now estimated that the crop being ginned will exceed \$200,000. A P. R. R. A. loan of \$30,000 was made to this cooperative to enable it to advance to its members 50 percent of the value of the cotton when delivered for ginning.

The purchasing cooperative (Sociedad Agricola), purchasing farm supplies for its members, increased its volume of annual business from \$216,000 to \$477,206. The P. R. R. A. made an additional loan of \$25,000 to the cooperative during the past year for working capital.

Additional operating loans totaling \$35,000 were made during the year to the fruit-growers' canning cooperative at Arecibo. The cooperative canned 24,440 cases of fruits and fruit juices, as compared with less than 10,000 cases during the previous season. The restrictions of the Fair Labor Standards Act, however, necessitated discontinuance of the canning of orange juice.

The Puerto Rico Rug Cooperative, although less than two years old, had an \$8,883 volume of business this year, of which a little more than \$2,000 represented profits for its members, on a total investment of only \$5,000.

The manual arts cooperative (Puerto Rico Artercraft Cooperative), to which the P. R. R. A. made a loan of \$20,000 last year, has been in operation for 8 months, during which time it has sold \$15,000 worth of hand-made products delivered to it by needy persons. Since the P. R. R. A. loan was available only for assistance to rural persons, the

cooperative consequently encountered difficulties in securing a sufficient variety of hand-made products to complete a full line of articles for its salesroom. During the next fiscal year it is, therefore, planned to repay the loan to the P. R. R. A., and to secure a loan from the Puerto Rico Self-Help Corporation, through which the arcraft cooperative may assist both urban and rural persons, thus enabling it to obtain hand-made articles produced in urban as well as rural areas.

The coconut-growers' cooperative was organized during the past year in response to petitions from growers on the Island, for the purpose of marketing coconuts produced by members, either as fresh fruit for export or through a plant recently established in the Island for the production of shredded coconut.

The Cooperative Handcrafts, Inc., of Puerto Rico, organized by the Puerto Rico Self-Help Corporation, had been forced to discontinue operations, because of inability to meet the requirements of the Fair Labor Standards Act. It is now in liquidation under supervision of the P. R. R. A. Cooperative Division.

Summing up, it may be said that the cooperative movement in Puerto Rico is steadily growing and improving. Those who are working with it, including cooperative members, management, cooperating public agencies, and the public in general, are gaining valuable experience in cooperative effort.

Cooperatives With Which the Cooperative Division of the P. R. R. A. Is Working

Name	Year organized	Financing agency	Products	Members	Amount invested	Annual business
1. Asociación Cooperativa de Productores de Vegetales de Puerto Rico.	1930	Insular Government.	Vegetables.	25	\$4,000	\$38,623
2. Puerto Rico Tobacco Marketing Association. ¹	1934	do	Tobacco	1,688	35,400	492,578
3. Puerto Rico Marketing Association for Minor Crops.	1935	Insular Government and P. R. R. A.	Cotton.	762	61,354	128,367
4. Cooperative Handcrafts, Inc., of Puerto Rico. ²	1936	F. E. R. A.	Needlework		13,734	
5. Asociación Azucarera Cooperativa Lafayette.	1936	P. R. R. A.	Sugar	751	4,875,718	2,275,708
6. Arecibo Fruit Growers' Cooperative Association.	1937	do	Fruit	85	105,000	35,592
7. Asociación Cooperativa de Productores de Hortalizas de Jayuya, Inc.	1937	do	Vegetables	130	7,000	35,675
8. Primus Potteries Cooperative, Inc. ³	1938	F. E. R. A.	Earthenware	271	30,000	
9. Puerto Rico Ruz Cooperative, Inc. ³	1938	do	String rugs	271	5,000	8,883
10. Sociedad Agrícola Cooperativa de Puerto Rico.	1938	P. R. R. A.	Farm supplies.	723	200,000	177,206
11. Puerto Rico Arcraft Cooperative	1939	do	Handicraft	203	12,500	15,011
12. Cooperativa de Cosecheros de Vegetales de Río Grande.	1939	do	Vegetables	125	5,000	19,640
13. Cooperativa Azucarera Los Caños	1939	do	Sugar	373	955,870	1,045,932
14. Cooperativa de Cosecheros de Vainilla de Puerto Rico. ³	1939	do	Vanilla	23	46	
15. Villalba Vegetable Growers Cooperative Association.	1940	do	Vegetables	96	5,000	30,715
16. Cooperativa de Productores de Coco de Puerto Rico.	1940	do	Coconuts	45	90	
Total.....				5,300	6,316,712	4,603,930

¹ Application for loan pending.

² Cooperatives organized by Puerto Rico Self-Help Corporation with F. E. R. A. funds.

³ This is a marketing cooperative with no capital invested. Crop not sold yet.

⁴ Could not operate under Fair Labor Standards Act requirements and is being liquidated.

⁵ Has been discontinued as a cooperative and sold to private interests.

SOCIAL SERVICE

In April 1936 the Social Service Section was established within the former Health Division to educate families in the rural resettlement projects in ideals of citizenship, and to provide facilities through which rural dwellers might better themselves and develop a more healthy understanding of community life. The work subsequently was placed under a Community Centers Section through which it has been carried out during the year just ended.

The work has been conducted through sixteen community centers, all located at P. R. R. A. resettlement developments, in furtherance of rural rehabilitation under funds allotted for that purpose. The extent of activities is indicated by the following: More than 700 applications for P. R. R. A. homesteads were investigated for eligibility in certain social aspects; 61 clubs, averaging in membership from 5 to 130 persons each, held about 925 individual sessions, involving an attendance of some 7,600 men and 5,800 women; 70 classes were organized, primarily for handicrafts, needlecrafts, wood-carving, adult education, and kindergartens, involving about 6,400 sessions and 15,600 men and 49,100 women in the aggregate; 24 special interest groups such as glee clubs, dramatics, debating, etc., functioned, holding about 550 sessions; other activities such as athletics, movies, etc., occupied 26,000 hours with a total of 308,000 spectators; several thousand visits were made to homesteaders and their families. A total of about 2,290 families with some 13,000 persons were considered as members of the several community centers.

Obligations for this program during the year just ended amounted to \$97,018. Since funds appropriated for the fiscal year 1941 will not permit continuance of the work, arrangements have been made to transfer all buildings and equipment to the Insular Department of Education.

HOUSING MANAGEMENT

Total rental collections from all P. R. R. A. housing units during the fiscal year amounted to \$221,290, as against total obligations for operations, including maintenance and repair, of \$119,923, leaving a net return of \$101,367, or \$16,630 more than the previous year. In the fiscal year 1939, obligations represented 59.48 percent of collections; this year obligations were 54.19 percent of collections, a net gain of 5.63 percent.

On June 30, 1940, all but nine of the 1,051 living units in the 5 urban developments were occupied, occupancy thus being 99.15 percent. In the rural areas, 2,263, or 91.51 percent of the 2,473 units in the large resettlement projects were occupied; in the scattered units

outside of these concentrated resettlement projects, 2,036, or 88.48 percent of the 2,301 dwelling units were occupied. The P. R. R. A. also leased at nominal rental of 50 cents a month each, 3,725 parcels of two to three acres in the various coffee, tobacco, and fruit areas, on which no houses have been built, these parcels being leased for cultivation by laborers who previously worked for the P. R. R. A. in connection with its rehabilitation program.

FORESTRY

A general forestry program for Puerto Rico, inaugurated in 1935, was continued under the joint auspices of the P. R. R. A., the Insular Forest Service, and the United States Forest Service. Up to June 30, 1940, P. R. R. A. had spent a total of \$255,489 for the purchase of 19,372 acres at an average cost of \$13.19 per acre. During the fiscal year just ended, 886.13 acres were purchased, amounting to \$10,597, or an average cost of \$11.96 per acre, with 3,689.74 acres under purchase options.

Parceleros.—The program of establishing forest homesteads (parceleros) in various forest areas was continued throughout the past year. Residence and cultivation permits have been and are being issued free of charge for from 5 to 10 acres of land. Permittees may reside and grow food crops on their lands, use wood from the forest for construction and repair of houses and other buildings and for fuel, in return for which each must reforest 2 acres of nonagricultural land. In addition, where such work is feasible, part-time employment usually running about two weeks per month is afforded on nearby forestry projects. As a means of further increasing the parcelero's income, materials from the forest will be wholesaled to the permittee as they become available for the manufacture and sale of charcoal, fence posts, etc.

During the fiscal year the acreage contained in individual homesteads was expanded where parts of tracts were deemed too steep and rocky. This resulted in a slight reduction in the number of permittees. Thus on June 30, 1940, there were 3,450 acres occupied by 690 families, contrasted with 2,148 acres in 700 homesteads on June 30, 1939.

Other forest activities.—During the year, 7 miles of truck trails at an average cost of \$9,550 per mile and 18 miles of foot and horse trails at an average cost of \$300 per mile were constructed, bringing the totals to 67 and 90, respectively.

Thirteen small field nurseries were operated to provide tree seedlings for planting and replanting work, producing approximately 2,074,000 seedlings, of which about 815,000 were planted. The total

production to date is estimated to be about 20,000,000 seedlings. New planting covered 709 acres at an average cost of \$10.70 per acre, while the replanting of areas previously planted to valuable tropical hardwoods covered 1,055 acres at an average cost of \$2.95 per acre. Approximately 7,200 acres of plantations were weeded 3 times during the year and vines removed from the trees at an average maintenance cost of \$6.25 per acre.

Timber stand improvement through the removal of weed species and malformed trees, was carried on in 3 forest areas, totaling 1,721 acres, at a cost of from \$6 to \$15 per acre. In addition, 1,168 acres of mangroves were planted in five areas at a cost of from \$3 to \$5 per acre.

ENGINEERING

Construction and repair work incident to the prosecution of the approved projects of the P. R. R. A. is the function of its Engineering Division. A summary of the year's activities shows:

The mill work for the pilot plant at the Tobacco Institute of Puerto Rico at Rio Piedras was completed, bringing the total project cost to approximately \$22,200. The home for aged women at San Juan was finished this year at a total cost in Federal funds of \$74,190, the municipality of San Juan contributing \$27,500. The restoration of two new wings to the headquarters building for the Insular Police at San Juan was finished early in the year at a total cost of \$42,190. A stadium for the Municipal Ball Park at Guayama was built at a cost of \$22,532.

Four concrete vocational education schools and a second-story for the Eleanor Roosevelt school, started last year, were finished this year. In addition, P. R. R. A. vocational schools at four resettlement projects were repaired. The four-story concrete engineering building of the college of agriculture and mechanic arts at Mayaguez, costing \$164,000, was completed except for minor details.

Two 1-story concrete R. O. T. C. armories, belonging to the University of Puerto Rico, started last year at Rio Piedras and Mayaguez, were completed at a cost of \$74,042 and \$50,049, respectively. The 3-story concrete library building and the 4-story concrete laboratory building at the School of Tropical Medicine, undertaken last year, were brought to within 5 percent of total completion.

The filling and draining of swamp lands near the Lafayette Sugar Mill, important especially to the checking of malaria, was completed with an allotment of \$45,000. Out of an allotment of \$476,429, work on 17 other new swamp drainage and malaria control subprojects was prosecuted during the year, the project locations being recommended by the Insular Department of Health.

Twenty-eight water-supply systems were commenced in several of the Federal resettlement areas at a cost of \$211,530, representing a physical completion of about 82 percent.

The largest expenditure was for the continuation of the program for constructing small resettlers' houses in the rural areas. Five hundred forty-one houses, partly constructed last year, were finished this year. In addition, the construction of 1,211 additional houses, entailing an expenditure of some \$1,712,000, was undertaken during the year. On June 30, 1940, there were 491 unfinished.

Continuing a program begun in prior years, approximately 14 miles of macadam roads were constructed in P. R. R. A. resettlement projects. In addition, 10 miles of trails leading from main roads to resettlers' houses were constructed and 39 miles of road graded. A total of \$40,488 was expended for such works as small storehouses, community centers and playgrounds, etc., including house wiring and street and park lighting. Eight hundred twenty-four animal-shed sets, each consisting of a granary, chicken coop and hog pen, were constructed at a cost of \$60,130.

A small hydroelectric plant for the Isabela Irrigation Service at Isabela was started and 70 percent completed at a cost of \$69,747.

The land survey section surveyed 695 parcels of land covering 4,115 acres. One hundred sixty aerial maps were furnished to other government agencies.

The landing field for the United States Marine Corps at Culebra was improved at a cost of \$30,000 through the installation of a complete tile drainage and the construction of open concrete line canals for disposing of excessive drain water. A project financed by W. P. A. for the construction of a tennis court at the United States Naval Radio Station in San Juan was administered by the Division.

During the year just ended, the Engineering Division employed an average of 8,680 men.

RURAL ELECTRIFICATION

Undertaken as an aid to the Insular Government for the development of water power, the program has embodied five separate projects. Three of these—Toro Negro Plants Nos. 1 and 2, and El Carite No. 3—have been completed with a power potentiality totaling 40,000,000 kilowatt-hours. The Las Garzas project, after being partially completed by P. R. R. A., was transferred in December 1938 to the Insular Government for completion under a loan and grant from the P. W. A. The fifth project, known as Dos Bocas, located between the cities of Arecibo and Utuado, is the only one which P. R. R. A. has had under construction this year.

The Dos Bocas project consists of a gravity type concrete dam 1,115 feet long by 185 feet high, and a power plant with an ultimate capacity of 25,000 horsepower. The reservoir will cover about 600 acres with a capacity of 30,600 acre-feet.

During the present year, \$1,030,940 was allotted for the project, bringing the total to date to \$3,497,000. With these funds, the project has been brought to about 60 percent of completion. For the fiscal year 1941, it is expected that \$1,960,000 additional P. R. R. A. funds will be allotted to complete the dam, powerhouse, penstocks and tail-race, and various auxiliary works, as well as to pay for lands for the reservoir and the installation of one generating unit of 8,333 horsepower.

THE FUTURE

There are a few encouraging prospective palliatives of the distressed Puerto Rican economy. The recent amendment of the Fair Labor Standards Act, as it applies to Puerto Rico, providing for a special committee to study and recommend the minimum wages to be paid to employees in Puerto Rico, may eventually stabilize employment and improve the condition of that part of the population which is dependent upon commerce as distinguished from agriculture. The intensified national defense program is employing a considerable amount of labor, temporarily relieving to some extent the ever-prevailing serious unemployment situation; but this has obviously neither absorbed nor offset the many thousands of women unemployed as a result of the closing of the needlework industry. The basic economic problem of Puerto Rico—that of a dense and ever-increasing population attempting to wrest a livelihood, mainly by agriculture, from exceedingly limited resources—remains unsolved.

The P. R. R. A. has done much to point the way toward increasing the income of the island both through physical accomplishments and by stimulating leadership in better methods of farming and new industries. Two outstanding examples of experiments which resulted in finding new industries economically sound are the cement plant constructed by the P. R. R. A. for the Insular Government, and the plant constructed at Lafayette with funds loaned by the P. R. R. A., for converting sugarcane residue into solvents such as acetone and butyl alcohol. Further industrial and agricultural development of the Island must depend upon progressive leadership and the availability of capital for full utilization of all of the Island's resources.

In both respects the P. R. R. A., it is believed, has made as substantial contributions as could be expected in the light of the limited funds and authority provided for its use under the Emergency Relief Appropriation Acts.

DIVISION OF INVESTIGATIONS

B. B. Smith, *Director*

THE Division of Investigations made substantial contributions to the defense program during the past fiscal year. The War Department was assisted in its program of national defense through the examination and classification of lands withdrawn for artillery ranges, aircraft bombing ranges, and other defense purposes, and in one case the Division assisted the Department of Justice in obtaining a restraining order preventing mineral claimants from performing work that was interfering with the use of the land as an airplane landing field for Army bombers. This cooperative work is continuing and additional requests for assistance by the War Department on other areas needed in connection with the national defense program has very considerably increased the work of the Division. This work will result in the cancellation of additional thousands of invalid mining claims and thus help the War Department protect itself from unjust claims for damages by persons attempting to hold title to the lands.

During the past several years in connection with investigations of various types for the Grazing Service particularly, considerable information as to the status of public lands has been secured. This information is being made available to the Army Air Corps for the purpose of enabling it to arrive at a decision as to what lands might be desired for inclusion within certain proposed bombing and gunnery areas.

For the purpose of determining the best economic use to which Kodiak Island in Alaska may be put, the Division has been making an investigation of general conditions on this island. Other work in Alaska has been intensified primarily because of the increased activity in the Territory due to plans for national defense, and examinations and classifications of lands have been made in connection with reservations established for the use of the War Department and the Civil Aeronautics Authority.

The work being done for the General Land Office by the Division of Investigations has become more intensified along the line of land classification and appraisal in the aid of the general conservation program of the Department. Many of these cases involve mineral examinations which not only assist in the general classification pro-

gram but incidentally furnish valuable information to the Geological Survey in the location of mineral deposits vital to the national defense program.

COOPERATION WITH OTHER AGENCIES

The cooperative work carried on with the Bureau of Reclamation is continuing and must be carried forward to keep pace with the construction activities in connection with the Grand Coulee, Shasta, and Friant Dams and other reclamation projects. All lands affected by these projects believed to contain mineral values are being examined and appraised by this Division and all invalid mining claims on the public lands affected are being examined and proceedings instituted to cause their cancellation. In one case the Division was able to present facts that resulted in a settlement for less than \$5,000, whereas the claimant had originally proposed a settlement on the basis of a valuation of \$50,000 for his land.

During the past year the Division continued to cooperate with the National Park Service and gathered information to assist in the land-acquisition program of the Olympic National Park, Wash., and to aid the Department of Justice in the handling of proposed condemnation suits with particular reference to alleged mineral values. Examinations and appraisals of lands within the Joshua Tree National Monument, Calif., are being made and proceedings have been instituted looking toward the cancellation of approximately 2,900 invalid mining claims affecting this area. Similar work has been done on lands recently added to Yosemite National Park, Calif. The Division also cooperated with the National Park Service in an investigation involving the theft of petrified wood from the Petrified Forest National Monument, Ariz., which resulted in the conviction and imprisonment of the person guilty of the theft.

The Division has assisted in the handling of cases affecting the conservation and use of public grazing lands, particularly with regard to applications for leases provided for under section 15 of the Taylor Grazing Act. In the performance of this work it is the policy of the Division to cooperate with the applicants to the fullest extent. Wherever possible conflicting applicants are brought together in an attempt to arrive at adjustments which would be satisfactory to the respective applicants, and at the same time meet with the requirements of the law and regulations as to the proper division of land and the conservation of grazing resources. This has been successful in most cases, but occasionally there have been conflicts concerning which it was impracticable to induce conflicting applicants to reconcile their differences. In such cases it has been necessary to recommend a division of lands which appeared equitable and in accordance with the law and regulations. There have been but very few appeals from the

recommended awards and, generally speaking, applicants for grazing leases are entirely satisfied with the awards which have been made as the result of the examinations and negotiations conducted by the Division of Investigations, and have been particularly pleased with the dispatch with which their applications have been acted upon. During the fiscal year 2,797 applications were investigated and reports submitted thereon for administrative action.

A number of grazing trespasses on public lands within grazing districts were investigated, resulting in the institution of either criminal or civil proceedings in the Federal courts. Other assistance rendered the Grazing Service included the service of notices pertaining to an important suit involving the administration of grazing lands in the State of Nevada.

During the fiscal year 1939 this office was called upon to make a survey of the property, equipment, and records of the United States Helium Plant, Amarillo, Tex., for the purpose of determining the cost of producing salable helium. The Bureau of Mines during the fiscal year 1940 again requested that this survey be made and in addition to making the survey and reporting the results thereof, agents of this office designed and installed supplemental cost accounting analysis records for this plant.

In view of the proposed transfer of those special agents engaged in making audits of various units under the Office of Indian Affairs, that work received special attention with the result that on the effective date of the transfer, July 1, 1940, such audits were on an approximately current basis.

Considerable work in connection with the examination of lands involved in applications for mineral patent and mining locations was done for the United States Forest Service, Department of Agriculture, under the interdepartmental agreement of 1915. A number of these cases resulted in the institution of adverse proceedings for the cancellation of the mineral entries or mining locations involved.

Attention has been given to the question of stock-driveway withdrawals. Many of the stock driveways were laid out many years ago and in some cases have been found to be disproportionate for their actual needs. One of those examined is approximately 60 miles long and from 5 to 6 miles wide. In the examination of this driveway there was involved the determination as to the lands accessible and necessary for a driveway, as it was evident that large portions of the withdrawn lands were being used for pasturage, lambing, and grazing grounds, rather than for the driving of stock to or from seasonal ranges or to market. Other driveways were found not to embrace sufficient lands, an example of which is the "33-Mile Drive" in Natrona County, Wyo. This driveway, which consists of two parts, starts at

the railway shipping points of Powder River and Arminto, and are known respectively as the "East 33-Mile Drive" and the "West 33-Mile Drive." Farther to the north and on the southeast slope of the Big Horn Mountains, these two driveways join and continue northward into the Big Horn Mountains. At this junction the trail was found to be only one-fourth mile wide, although stockmen have estimated that more than 120,000 sheep use this trail twice, going up to the mountains and coming back to the desert, in a single year. Stockmen have petitioned that an extra one-half mile be added to this strip through which, it has been estimated, more sheep pass than in any similar section of land in the world.

The following investigations, on which reports were submitted during the fiscal year ended June 30, 1940, were referred to the Attorney General for criminal prosecution:

Bribery	1
Conspiracy	2
Embezzlement	1
Forgery	1
Fraudulent homestead entry	1
Illegal trading with Indians	1
Impersonating a Government officer	1
Incendiary forest fires	1
Perjury	1
Possession of firearms within a national park	2
Soliciting political contributions	1
Submitting false claims against the United States	5
Theft of Government funds	1
Theft of Government property	2
Unlawful disposition of livestock	1
Trespass:	
Coal	3
Timber	3

Indictments were returned against 15 individuals and 1 corporation. Sentences were imposed in 14 cases, either upon convictions or pleas of guilty.

The Division has cooperated with other law-enforcement agencies in the apprehension and prosecution of persons engaged in the practice of fraudulent schemes in connection with the filing of applications for oil and gas leases. One defendant who was convicted in the State court on grand theft charges was fined \$1,500, sentenced to 18 months in the county jail of Los Angeles, and placed on probation for a term of 15 years. In another case the defendants were arrested and held in jail awaiting trial in the State court on grand theft charges. Other similar cases are also receiving attention.

An investigation of unusual interest made by this Division during the fiscal year 1940 was for the purpose of locating one Lloyd Patter-

son, alias Richard Jordan, who was under indictment for the theft of Government property in Puerto Rico. The search for Jordan led from Puerto Rico through a great portion of the United States, finally terminating in his apprehension in Philadelphia on November 15, 1939. During the search for Patterson most of the property stolen by him, consisting of motion-picture cameras and equipment, was recovered by agents of this office. In his flight from place to place, Patterson had sold this property to obtain funds. Upon the apprehension of Patterson it was ascertained that he was a parole violator from McNeil Island and that he had approximately two dozen aliases. After serving the balance of the original sentence, he was returned to Puerto Rico where he entered a plea of guilty to the theft of the property and was sentenced to prison for a term of 8 years.

One investigation involved the application for right-of-way of the Utah Oil Refining Co. of Salt Lake City, Utah, which, during the fall of 1939, constructed an 8-inch oil pipe line from Fort Laramie, Wyo., to Salt Lake City, Utah. Investigation was made for the purpose of enabling the Department to consider the application for right-of-way, and in view of the rapidity with which the construction of the pipe line was carried on, it was necessary to conduct the investigation expeditiously and in an intensive manner. This pipe line involved an expenditure of approximately \$3,000,000 and the application for right-of-way involved public land throughout a greater distance than any right-of-way application in modern times, and probably since the construction of the transcontinental railroads.

A task of considerable magnitude was the collection of evidence relating to the validity of numerous oil placer claims in the Lance Creek oil field in Wyoming. Practically every special agent in one of the regional offices had a part in the effort to locate owners or interested parties in these claims and obtain additional evidence concerning claims previously reported on. A great deal of difficulty was experienced because of the fact that a number of the individuals to be interviewed had not worked in the Lance Creek field for 20 years and were scattered not only throughout the United States, but in some cases had migrated to foreign countries.

Another unusual investigation had to do with an oil and gas lease embracing public lands of the United States in the South McCallum Field, Colorado. In connection with this case it was necessary to conduct an investigation as to the equities of the lessee and the operating company. It was also necessary to make a study of the economic factors relating to the possible production of oil and gas, and also conduct a geological study with respect to the possible discovery of petroleum products and the future development of the field in accordance with the conservation policies of the Department.

A special effort was put forth by one of the regional offices to determine the extent of occupancy of public lands in cases where no attempt had been made by the occupants to obtain title from the Government. A surprising number of instances were found where settlements had sprung up. One such settlement, Bumble Bee, Ariz., included, besides the post office, a filling station and 5 dwelling houses. As a result of this survey, it is contemplated that action will be taken to require the occupants to clear their titles or vacate the lands.

SUMMARY

The number of employees in the Division of Investigations as of June 30, 1940, was 147, exclusive of those who were serving temporary appointments. Of that number 133 were paid from the regular appropriation and 14 from allotted funds. The Division consists of a central office and 5 regional offices which are located at San Francisco, Calif.; Billings, Mont.; Salt Lake City, Utah; Albuquerque, N. Mex.; and Washington, D. C.

During the year investigations were made which affected practically every activity of the Department, and a number were made for other agencies of the Government. On July 1, 1939, there were pending 8,907 cases for investigation. During the year 20,326 new cases were received and reports were submitted on 15,001, representing the largest number of cases investigated during any year since the formation of the Division of Investigations. At the end of the fiscal year there remained uninvestigated 14,232 cases.

EXPENDITURES

During the fiscal year 1940 the Division of Investigations operated under an appropriation of \$548,000 which was expended as follows:

Salaries:

Departmental.....	\$ 38,379.50	
Field.....	329,748.42	
		\$368,127.92
Office supplies and equipment.....		7,398.00
Travel expense and per diem.....		111,940.00
Purchase, maintenance, and operation of automobiles.....		40,534.00
Communication expenses.....		2,150.00
Transportation of things.....		2,200.00
Rent of office space.....		2,700.00
Repairs to equipment.....		216.00
Stenographic services.....		77.20
Miscellaneous current expenses.....		3,170.00
Unobligated surplus.....		9,486.88
Total appropriation.....		548,000.00

OFFICE OF THE SOLICITOR

Nathan R. Margold, *Solicitor*

Constant expansion of the essential services rendered the public by the Department of the Interior, and greater particularization of the duties required from the Department by law, have long combined to produce a steady and rapid increase in the demands for legal assistance made upon the Solicitor and the personnel of his office. This upward trend persisted throughout the fiscal year 1940.

Many of the duties of the immediate office of the Solicitor have a vital bearing upon the national defense. The conservation, protection, development, and utilization of petroleum and other mineral resources, the harnessing of water power for the production of hydro-electric energy, the maintenance of the livestock supply without which no army could long continue to function, the conduct of essential governmental operations in the territories and outlying possessions, and the application of the public lands to the upbuilding of a strong national economy are all activities whose national defense significance is manifest, and whose conduct would be very nearly impossible without competent legal services.

Analysis of the work in the immediate office of the Solicitor indicates that its volume was approximately 20 percent greater during the fiscal year 1940 than during the preceding fiscal year. The number of oil and gas leases presented for consideration was, for example, more than double the number received in the fiscal year 1939. This increase was registered notwithstanding reductions in certain classes of items resulting from transfers of final responsibility to other offices.

The volume of legal work handled in the immediate office of the Solicitor is indicated by the following table:

Requests for formal Solicitor's opinions.....	380
Legal memoranda and correspondence.....	1, 142
Appeals from adjudications of the General Land Office and Grazing Service.....	439
Motions for rehearings and petitions for the exercise of supervisory authority.....	71
Board of Equitable Adjudication cases.....	1, 393
Legislative matters.....	1, 626
Construction and supply contracts.....	1, 553
General Land Office matters, except mineral and grazing leases.....	3, 527

Oil and gas leases.....	2, 161
Other mineral leases.....	172
Grazing leases.....	2, 263
Geological Survey matters.....	205
Bureau of Mines matters.....	101
Petroleum Conservation Division matters.....	47
War Minerals Relief cases.....	183
Grazing Service matters.....	185
Office of Indian Affairs matters.....	8, 886
Bureau of Reclamation matters.....	1, 245
National Park Service matters.....	1, 053
Division of Territories matters.....	317
Division of Investigations matters.....	122
Biological Survey matters.....	803
Bureau of Fisheries matters.....	93
St. Elizabeths Hospital matters.....	6
Alaska Development Program matters.....	4, 552
Miscellaneous items.....	249
Total.....	32, 774

Thirty-seven suits in the District Court or Court of Appeals for the District of Columbia and two in the Supreme Court of the United States were defended by the Solicitor and his staff during the year. Fifteen of these were suits brought against the Secretary of the Interior or other officers to test the legality of acts performed by them in an official capacity. The remaining 24 were suits instituted under the provisions of the war minerals relief legislation.

Questions of vital importance to the preservation of the interests of the United States in the oil and gas deposits of the public domain, together with complex problems of administrative law, were presented in *Dunn v. Ickes*, a case brought to test the scope of the authority vested in the Secretary of the Interior with respect to the consideration of applications for oil and gas leases under the Mineral Leasing Act of February 25, 1920. Decisions upholding the contentions of the Department in this controversy were entered by both the District Court and the Court of Appeals.

The highly important suits of *Fox v. Ickes*, *Parks v. Ickes*, and *Eder v. Ickes*, contesting the authority of the Secretary of the Interior to redetermine the amount of water deliverable to water users on a reclamation project under the contracts now in effect, and to impose rental charges for water used in excess of the amount thus redetermined, were tried in the District Court and a decision sustaining the position of the Department rendered. The case of *Burley Irrigation District v. Ickes*, raising issues fundamental to the utilization of water on reclamation projects for the generation of hydroelectric power, was

argued in the Court of Appeals, after a decision favorable to the Department in the District Court during the preceding fiscal year.

In *Glass v. Ickes* the action of the District Court in dismissing a libel suit attacking the privileged character of public statements made in the performance of official duties was sustained by the Court of Appeals. This decision clarifies authorities of the Secretary of the Interior and other Department heads that are of prime importance to the efficient conduct of the public business.

The transfer of the functions of the Bureau of Insular Affairs from the War Department to the Department of the Interior, which became effective on the first day of the fiscal year, added an entirely new type of litigation work to the duties of the Office of the Solicitor. This work consisted of the defense in the Supreme Court of the United States of actions against officials of the Commonwealth of the Philippines brought in the insular courts and sought to be appealed to that tribunal.

During the course of the year the Court of Appeals disposed of the War Minerals Relief cases of *Mineral Ridge Manganese Corporation v. Ickes* and *Crowley v. Ickes* on a basis in line with the contentions of the Department. In the former case the holding of the District Court that determinations of the Secretary of the Interior rendered pursuant to the War Minerals Relief Act of May 18, 1936, are not reviewable was affirmed. Fourteen War Minerals Relief cases instituted under other laws were disposed of by the District Court, leaving eight such cases pending at the close of the fiscal year.

The preparation of decisions in public land cases appealed from the General Land Office and in grazing cases appealed from the Grazing Service is another highly important duty of the Solicitor. The number of appeals disposed of during the fiscal year was 535 and the number of appeals pending at the close of the year was 258. A decision of special note during the year was that on the so-called *Section 16 case*. This adjudication presented the question whether a square mile of oil lands in the Elk Hills field of California was known to be mineral in character at the time of the approval of the official survey, and was, by reason of this fact, excepted from the school land grant made to the State of California under which title had been asserted adversely to the United States. The value of the lands determined to be the property of the United States in this case probably exceeds several millions of dollars. Many of the other appeals considered presented issues of large monetary or social significance.

Title work performed in the office of the Solicitor is summarized in the following table:

Title examinations and reviews-----	820
Formal title opinions-----	68
Condemnation cases and miscellaneous items-----	1,930
Total-----	2,818

At the end of the year 98 title cases were pending, awaiting examination and review or the preparation of a formal title opinion.

One of the most important and prolonged public land controversies ever to come before the Department or the courts, *United States v. Standard Oil Company of California*, was brought to a successful conclusion during the year, through the affirmance of the decision of the District Court for the Southern District of California by the Circuit of Appeals for the Ninth Circuit, and through the denial of a vigorously pressed petition for certiorari by the Supreme Court of the United States. This action resulted in the quieting of the Government's title to section 36 in the Elk Hills oil field of California, a square mile of valuable oil lands in the geologic center of a naval petroleum reserve, and in the recovery of approximately \$7,137,000 as damages for the oil and gas extracted from that section while adversely held under claim of title.

Another public land controversy of scarcely less importance, in which a favorable decision was rendered by the Supreme Court during the year, was *United States v. City and County of San Francisco*. The decision of the Supreme Court upheld the constitutionality of the provisions of the Raker Act of December 19, 1913, requiring municipal distribution of electric energy produced through the use of the lands and rights-of-way granted San Francisco under that act, as a valid exercise of the power of the Congress to control the disposition of the public domain, and sustained the contention of the Department that the arrangements for the distribution of such energy made by San Francisco were not in conformity with these provisions.

Grazing matters received during the year presented many problems of considerable difficulty. Regulations under the Pierce Act of June 23, 1938, were drafted. Important litigation relating to the authority of the Secretary of the Interior to impose license fees in connection with grazing operations on the public domain was pending at the end of the year.

The making of far-reaching adjustments in the rates charged for electric energy produced at the Boulder Canyon Dam was an outstanding item among the many reclamation problems handled. Another matter of exceptional importance was the preparation and

presentation of the Government's case in *Nebraska v. Wyoming and Colorado*, an original suit in the Supreme Court for an equitable apportionment of the waters of the North Platte River. The United States has formally intervened in this suit in order to protect its claim to the ownership of all unappropriated waters on the public domain and its large investment in reclamation projects on the North Platte River.

The enforcement of the Connally "Hot Oil" Act required a large amount of attention during the fiscal year, and extensive collaboration with the Department of Justice in analyzing evidence of violations and in preparing cases for trial. Fundamental questions concerning the authority of the Department to require companies allegedly engaged in producing oil solely for intrastate consumption to submit reports on their operations were presented in several cases.

During the fiscal year the Solicitor's staff prepared, with the aid of the Department of Justice, a compilation in 46 volumes of all Federal laws and treaties pertaining to Indian affairs, and a comprehensive Handbook of Federal Indian Law, designed primarily to provide administrators, United States attorneys, the Indian tribes and their attorneys with legal guidance on the many complex problems in this field. The handbook was based on an analysis of more than 4,000 statutes and treaties and 5,000 judicial decisions and administrative rulings.

The transfer of the Bureau of Biological Survey, the Bureau of Fisheries, and various other agencies or functions to the Department of the Interior at the beginning of the fiscal year added materially to both the volume and the variety of the work load in the immediate office of the Solicitor.

The quantities and types of legal work having to do with the administration of the Territories and outlying possessions of the United States were measurably enlarged. Matters of a highly diverse character relating to Alaska, Hawaii, Puerto Rico, the Virgin Islands, the Philippines, Canton Island, and Antarctica were passed upon during the year.

Proper determination of the legal questions which arise in connection with the administration of the public domain is largely dependent upon the work of the Law Division of the General Land Office. The total number of matters disposed of by the Division during the fiscal year 1940 was 36,944, as compared with a total of 38,826 matters disposed of during the fiscal year 1939.

Approximately 50 percent of the work handled during the fiscal year related to the issuance and enforcement of oil and gas leases under the Mineral Leasing Act of February 25, 1920. A major problem presented was the validity of certain legal objections raised

by interested parties to a proposed award of potash leases. Issuance of these leases paved the way for increasing the production of potash in the United States to the extent necessary for bringing about national self-sufficiency in this important fertilizer ingredient, which was formerly imported in considerable quantities from Germany, Spain, and other foreign countries. Proceedings instituted by the United States to determine the validity of a number of valuable unpatented oil claims in the Lance Creek field of Wyoming were another item of primary significance. In all, the number of mineral matters handled increased from 22,654 items in 1939 to 23,699 items in 1940.

Recommendations for the institution of suit were made in 16 cases, and sums aggregating \$22,865.26 were recovered through suit. The administrative disposition of trespass matters resulted in the collection of sums aggregating \$18,215.23 in satisfaction of the administrative findings.

The conservation of oil, gas, and other mineral resources absolutely necessary in the conduct of modern mechanized warfare and the utilization of these vital sinews of national defense in the most effective manner were the principal subjects of legal work for the Geological Survey. Military significance also attaches to those aspects of this work which have to do with the topographic mapping of the United States and Alaska, the investigation of water resources capable of producing hydroelectric power, and the protection of inventions adaptable to wartime use made by the scientific personnel of the Department.

This legal work centered in large degree around the task of administering operations under oil and gas leases on the public domain. The number of matters handled increased from 2,271 in the fiscal year 1939 to 2,533 in the fiscal year 1940.

Preparation and negotiation of unit plan agreements designed to bring about the maximum ultimate recovery of oil and gas from each natural operating area formed an important branch of the work. During the fiscal year, 9 unit plan agreements, covering approximately 198,000 acres of oil and gas lands, were completed. One of these involved the principal producing lands of the Salt Creek field in Wyoming from which oil having a gross value in excess of 300 million dollars has already been obtained.

Legal matters relating to the Indians of the United States and to the services and activities of the Federal Government in their behalf covered an extremely diversified range of subjects.

Some indication of the scope of the problems may be afforded by reference to activities in the field of Indian litigation alone

during the fiscal year. In this period 288 cases were referred to the Department of Justice for institution of suit or other appropriate action, 499 cases referred to the Department of Justice were finally closed, while 363 cases were still pending at the end of the fiscal year.

Several suits involving timber operations on Indian lands were successfully concluded during the year, \$177,000 being recovered in a single case. The long-standing controversy over the reasonableness of the 3 percent base deductions made by certain oil companies, when computing royalties on oil extracted from lands of the Osage Indians, to cover losses allegedly sustained on account of sediment, impurities and shrinkage, terminated in a decision favorable to the oil companies in the Circuit Court of Appeals for the Tenth Circuit.

Sixty-nine suits brought by Indian Tribes against the United States were pending in the Court of Claims at the end of the fiscal year. Several such suits were finally disposed of during the course of the year.

During the fiscal year upwards of 25,000 matters required consideration by attorneys assigned to Bureau of Reclamation work. This was approximately 5,000 more matters than were disposed of during the preceding fiscal year.

Twenty-four suits, including one in the Supreme Court of the United States, were completed during the fiscal year, as compared with an average of 18 suits closed during each of the 4 preceding years. Fifty-nine suits were pending at the end of the fiscal year. Water right litigation in particular required much attention by the legal staff. Suits relating to water rights on the Humboldt River were, after considerable difficulty, settled by mutual agreement. At the end of the year important water right litigation affecting the Kendrick, North Platte, Carlsbad, and Yakima Projects was still pending, while proceedings affecting other projects were in the immediate offing.

Approximately 5,000 contracts involving approximately \$70,000,000 were handled during the year. Of special significance were contracts for the sale of power in connection with the Parker Dam Project, and contracts for the acquisition of power sites and the relocation of public utilities in connection with the Columbia Basin Project.

A large volume of legal work pertaining to the national park, monument and parkway system, and to the general recreational planning program carried on by the Federal Government in cooperation with the several States was cared for by the Office of Chief Counsel of the National Park Service. During the fiscal year 1940 more

than 24,000 matters were handled, an increase of approximately 2,000 over the number handled during the preceding fiscal year.

Active acquisition programs were carried on for the Great Smoky Mountains National Park, the Grand Canyon National Park, the Colonial Parkway, and the Olympic public works recreational project. A special office was established in Seattle to handle the numerous individual transactions incident to the Olympic acquisition program.

An important item of achievement was the negotiation of a contract with the city of Williamsburg, Va., granting an easement for the construction of a tunnel to carry the Colonial Parkway beneath several of the city streets. Others were the negotiation of a contract for the purchase of approximately 16,600 acres of land, together with flood rights, for the Great Smoky Mountains National Park, and the negotiation of a cooperative agreement for the management and operation of the old Philadelphia customhouse as a national historical site.

A large part of the work of the legal staff of the Biological Survey during the fiscal year consisted in the examination of titles and the handling of other matters connected with the acquisition of lands for use as bird and game refuges or sanctuaries. Land acquisition transactions completed during the year numbered 148, and involved lands having an aggregate area of 42,000 acres and an aggregate value of \$386,000. At the end of the fiscal year 442 condemnation cases and 251 purchase cases were pending in various stages of completion.

The institution and maintenance of criminal proceedings based upon alleged infractions of the Migratory Bird Treaty Act or other laws administered by the Biological Survey was another important field of work. Approximately 500 cases of alleged violations were submitted to the legal staff for review.

Substantial increases in the tasks of the Legal Division of the Bonneville Power administration occurred during the fiscal year, as work on the transmission system progressed and market outlets became more numerous. Condemnation proceedings against 570 separate tracts of land for transmission line and related purposes were completed during the course of the fiscal year, while proceedings to condemn 611 tracts were pending at the end of this period. Construction and procurement contracts to the number of 702 were passed upon, and approximately 225 claims against the Administrator were examined and disposed of. The Legal Division took part in the drafting and negotiation of power contracts. Outstanding among these were two contracts with the Aluminum Company of America providing

for the sale to that company of a total of 64,000 kilowatts of prime power.

The Legal Division of the Puerto Rico Reconstruction Administration performed numerous legal duties having to do with the conduct of the multisided rehabilitation program being carried on for the benefit of the people of Puerto Rico. The number of land acquisition cases completed during the year was 938, leaving 426 such cases pending at its close. Court actions amounted to 490 in number.

Legislative work was unusually heavy during the fiscal year, due in part to the fact that the Congress was in almost continuous session. During the fiscal year more than 100 laws directly affecting the work of the Department of the Interior were enacted. Some of the more important of these were as follows:

Public No. 407: An act authorizing States owning lands or interests therein acquired from the United States to include the same in certain agreements for the conservation of oil and gas resources.

Public No. 424: An act to establish the Kings Canyon National Park, Calif., to transfer thereto the lands now included in the General Grant National Park, and for other purposes.

Public No. 429: An act to amend the Bonneville Project Act.

Public No. 431: An act granting easements on Indian lands of the Wind River or Shoshone Indian Reservation, Wyo., for dam site and reservoir purposes in connection with the Riverton Reclamation project.

Public No. 445: An act to amend the act authorizing the President of the United States to locate, construct, and operate railroads in the Territory of Alaska, and for other purposes.

Public No. 457: An act to amend section 6 of the Organic Act of Alaska.

Public No. 475: An act to authorize the Secretary of the Interior to permit the payment of the costs of repairs, resurfacing, improvement, and enlargement of the Arrowrock Dam in 20 annual installments, and for other purposes.

Public No. 486: An act for forest protection against the white-pine blister rust, and for other purposes.

Public No. 520: An act to authorize the purchase of certain lands adjacent to the Turtle Mountain Indian Agency in the State of North Dakota.

Public No. 532: An act to authorize the withdrawal of national-forest lands for the protection of watersheds from which water is obtained for municipalities, and for other purposes.

Public No. 565: An act to confer jurisdiction on the State of Kansas over offenses committed by or against Indians on Indian reservations.

Public No. 566: An act to amend the act of June 30, 1936 (49 Stat. 2041), providing for the administration and maintenance of the Blue Ridge Parkway, in the States of Virginia and North Carolina, by the Secretary of the Interior, and for other purposes.

Public Resolution No. 79: Joint resolution to authorize compacts or agreements between or among the States bordering on the Atlantic Ocean with respect to fishing in the territorial waters and bays and inlets of the Atlantic Ocean on which such States border, and for other purposes.

Public No. 586: An act to provide for the establishment of the Cumberland Gap National Historical Park in Tennessee, Kentucky, and Virginia.

Public No. 593: An act to authorize the Secretary of the Interior to convey to the State of North Carolina for use in connection with the Blue Ridge Parkway certain land within the Cherokee Indian Reservation in the State of North Carolina.

Public No. 597: An act to transfer certain Indian lands to the Grand River Dam Authority, and for other purposes.

Public No. 636: An act to extend the time limit for cooperation between the Bureau of Reclamation and the Farm Security Administration in the development of farm units on public lands under Federal Reclamation projects.

Public No. 689: An act to amend the act entitled "An act to provide for the establishment of the Cape Hatteras National Seashore in the State of North Carolina, and for other purposes," approved August 17, 1937 (50 Stat. 669).

Public No. 690: An act for the acquisition of Indian lands for the Grand Coulee Dam and Reservoir, and for other purposes.

CONCLUSION

The legal services rendered the Department of the Interior and its various bureaus and offices by the Office of the Solicitor during the fiscal year 1940 were of greater magnitude than ever before. The legal and factual issues which had to be coped with were in many instances inordinately complex. A new peak was reached in the numerical volume of matters received and considered. The essential need of the Office of the Solicitor is for additional personnel to carry on its ever-widening circle of tasks.

BITUMINOUS COAL DIVISION ¹

H. A. Gray, *Director*

ON October 1, 1940, minimum prices and marketing rules and regulations for the stabilization of the marketing of bituminous coal produced throughout the United States became effective.

Market stabilization is prescribed by the Bituminous Coal Act of 1937 as a means of relieving the economic ills which have pervaded the coal industry for nearly 20 years. The grave social and economic consequences of the conditions in this industry affect the entire nation; they are described in the reports of the many extensive public investigations and studies which ultimately led to passage of the Coal Act.

The minimum prices are designed to maintain a "cost floor" under the prices at which coal may be sold at the mine and to prevent the incessant price-cutting which has kept the coal markets demoralized. The marketing rules are designed to prevent evasion of the minimum prices and to implement the prohibitions against unfair trade practices which Congress wrote into the law. They cover the sale of practically all of the coal produced in the country.

CONDITION OF THE COAL INDUSTRY

Although the demand for coal now greatly exceeds that of any recent period and this year's production is expected to equal or to exceed that of any other year in the past decade, the market prices of coal generally have not responded to the stimulus of increased buying.

When the losses and gains of the coal industry are counted, it will be found that right up until the very day minimum prices became effective, the industry continued to sell a large part of its production at prices substantially below cost. It has been forced to do this for many years in the past.

The effect of demoralized coal markets upon the financial status of the coal industry is vividly shown by the income tax reports on file

¹ Pursuant to Reorganization Plan No. II, effective July 1, 1939, and orders of the Secretary of the Interior issued in accordance therewith, the Division, by and through its Director, administers the functions vested by the Bituminous Coal Act of 1937 in the National Bituminous Coal Commission, which was abolished by Reorganization Plan No. II.

at the United States Bureau of Internal Revenue as reported by the National Coal Association. They reveal that the coal industry has suffered a net deficit amounting to millions of dollars each year since 1927. This annual deficit has ranged from a high of over \$50,000,000 to a low of more than 7½ million dollars. No statistics are available for the years of 1926 and 1927, but those for 1925 show a net deficit of more than \$22,000,000.

This terrific financial drain upon the coal industry, which has continued to the present day, has been at the roots of the social and economic problems presented by the coal industry and felt generally throughout the United States.

COAL ACT CONSTITUTIONAL

The condition of this industry was the subject of comment by the Supreme Court of the United States in its decision upholding the constitutionality of the Coal Act. This decision was handed down in the case of *Sunshine Anthracite Coal Co. v. Adkins* on May 20, 1940. (A more detailed account of this case is contained elsewhere in this report.) The Court, quoting the late Justice Cardozo with approval, pointed out that free competition in the coal industry had "degraded into anarchy" and that

"Overproduction and savage competitive warfare wasted the industry. Labor and capital alike were the victims. Financial distress among operators and acute poverty among miners prevailed even during periods of general prosperity."

Although the circumstances and conditions of the long depression in the coal industry have many aspects, it can be simply stated that the most significant fundamental condition of the coal industry which has led to the minimum price legislation is the fact that the industry's productive capacity has been far in excess of the demand for bituminous coal. The factor of decreasing market for coal is attributable in large measure to the increased and increasing efficiency in the use of coal and also in part to the availability of competitive forms of energy.

PRICES KEPT BELOW COST

The Director of the Coal Division, in his Findings of Facts accompanying the minimum price determinations, dated August 8, 1940, stated:

"The excess productive capacity, coupled with constant or diminishing demand, sent prices down. For various reasons producers would sell coal below cost. * * *. As one of many raw materials, coal does not bulk large in most manufacturing costs. Although demand is variable, its substantial variations are not proportionate to changes in price, but are influenced primarily by general business activity.

“* * * producers cut prices in order to dispose of their coals. Indeed for long periods during the past two decades, the industry realized less than its average cost of production. And the bituminous coal industry is unlike some industries in which production tends to adjust itself with some flexibility to demand.

“Coal producers commonly continue to produce coal, though realizing less than the cost of production, because of the high cost of temporarily shutting down a mine—due to taxes and possibly royalties, and to the expenses of physical repairs in reopening a mine. Production below cost, therefore, is the condition of many producers who continue as long as they have the resources to carry on in some fashion and as long as they can continue to hope that the condition of the coal industry, or their individual fortunes, may be ameliorated. In appraising the force of this aspiration, we should not overlook the homely truths that man awakens slowly to adversity and that hope springs eternal in the human breast. Moreover, persons trained in one industry cannot lightly abandon it and take up another.”

NOT REMAKING INDUSTRY ANEW

The Director of the Coal Division, in the Findings of Facts, stated that the administrative agency “was not instructed, and it has not attempted, to remake the industry anew, or to set prices upon its conception of industry efficiency or the advantages of a planned economy.”

The minimum prices must yield the industry an income equal, as nearly as possible, to its average cost and must reflect the relative values of the different coals and other competitive factors. The Director pointed out that Congress intended that the minimum prices should preserve for the coal producers the “fair” competitive opportunities to sell their coal which they enjoyed under unregulated competition. However, he said, the Coal Act necessarily eliminates the “competitive opportunity” of producers to attempt to make inroads on markets by price cutting resulting in lowering the coal industry’s income below its average cost. It also eliminates the “competitive opportunity” to make sales by means of dumping, the sale of “distress coal,” manipulations resulting in discriminations between individual consumers in the same market, and “all the other chaotic forces which were present in bituminous coal markets under free and open competition.”

The minimum prices and marketing rules, therefore, were formulated with these standards of Congress in mind.

COAL VITAL TO NATIONAL DEFENSE

The bituminous coal industry, whose financial stability and economic security the Coal Act seeks to bring up to a par with American industry in general, is vital to national defense. The stability of this industry, therefore, is of paramount public importance. Bituminous coal furnishes approximately half of the Nation’s total of all energy

derived from minerals and water power. (This total energy includes gasoline and oil consumed in internal-combustion engines.) It furnishes approximately 85 percent of all fuels and energy consumed by the railroads, 49 percent of that used by electric public-utility power plants, and about 75 percent of that used by general manufacturing plants.

Bituminous coal is a basic material used in the manufacture of steel. It is the raw source of hundreds of other commodities, such as explosives, medicines, paints, plastics, chemicals, artificial silk and rubber, etc. Many commodities, necessary to national defense, which the country formerly had to import from across the seas now may be synthetically manufactured from bituminous coal, thus contributing greatly to our national security.

In addition to the effect that strengthening of the coal industry will have upon immediate national defense needs, the placing of coal marketing upon a stable basis is expected to have an important bearing upon future national security. The conservation of our present known deposits of excellent coals, necessary for present industrial uses, is imperative to the future security of the nation.

The Committee for Mineral Policy of the National Resources Board, after a study, in 1933 reported that the great underlying cause of the excessive waste which is depleting prematurely these limited coal deposits is "destructive competition." This is the sort of competition which the minimum prices and marketing rules and regulations are designed to eliminate. Stabilization of coal markets will remove, then, one of the fundamental causes of excessive waste.

WASTE IS TREMENDOUS

Numerous authorities have pointed out that although America has huge coal deposits, the life of the beds of finer and more cheaply produced coals, such as those upon which the manufacture of steel and many other commodities depend, is limited. Their conservation is considered of immediate public concern. Mining now is concentrated in these deposits. The waste in mining bituminous coal in the United States has been authoritatively estimated to be approximately 35 percent of the coal exploited, as compared to a waste of from 5 to 10 percent in western Europe. This was shown by field studies in 1923 by engineers of the United States Bureau of Mines and the United States Coal Commission, headed by the late John Hays Hammond, internationally known mining engineer.

The Mineral Policy Committee of the National Resources Board stated, in 1934, that with the use of standards of engineering already shown to be feasible by the practice of the better companies this loss

could be reduced to 15 percent of the coal exploited. This means that the loss of 20 percent of the coal exploited could be prevented. The annual avoidable loss has been placed as high as 150,000,000 tons of coal, left behind in the mines under conditions that virtually prevent its being recovered thereafter. Coal Division research experts have computed that this is enough coal to equal the combined annual normal coal requirements of Italy, Spain, France, Belgium, and Holland, with Scandinavia thrown in for good measure.

CONDITIONS GREW WORSE

The National Resources Board report for 1934 stated that conditions then were worse than at the time the studies were made by the Bureau of Mines and the United States Coal Commission. In 1934, in connection with the antitrust suit brought by the Government against Appalachian Coals, Inc., Howard N. Eavenson² gave the following testimony which is quoted in the report:

"I think I could make the broad assertion that there is not a single bituminous mine in the country today that is not mining the very best coal that it has, and the cheapest, and is allowing portions of the mine to get into shape where a lot of the coal will never be recovered, because they cannot afford, at present prices, to mine it."

This preventable waste can readily be seen to be hastening the depletion of these necessary coal beds. To meet price-cutting competition, under unregulated markets, there has been a tendency in the coal industry to cheapen production costs by mining only the coal which could be extracted at the least expense. Coal which could be recovered and sold competitively under stable market conditions is left in the mines, where it becomes unrecoverable. The premature closing of mines, due to bankruptcies and cessation of business, also is responsible for leaving in the ground unmined coal destined to become permanent waste.

The Mineral Policy Planning Committee of the National Resources Board pointed out in a report in 1934 that only a financially stable company can afford competent engineers and adequate technical supervision; that is an important factor, since large tonnages are lost in squeezes due simply to lack of engineering control.

This committee reported in 1934 that the famous smokeless beds in southern West Virginia would last but 85 years, at the 1929 production rate, while the highest grade gas and metallurgical coals were 11 percent exhausted in Kentucky and 22 percent exhausted in southern West Virginia and Virginia. The life of the Pittsburgh bed in Pennsylvania was limited to 100 years. These coals, the committee stated, "are

² At that time Mr. Eavenson was president of the American Institute of Mining and Metallurgical Engineers.

the foundation of the American steel industry and their depletion will handicap not only steel itself but all industries depending on steel."

COOPERATING IN NATIONAL DEFENSE

In addition to the immediate and future effect that the stabilization of coal markets is expected to have upon national security, the Coal Division is and has been cooperating with the agencies administering the national-defense program. From its vast store of statistical data concerning the coal industry, the Division is furnishing information whenever requested in connection with the defense program. The Division will continue to provide this cooperation whenever called upon in the future.

Available for the purpose of facilitating the efficient distribution of coal in any emergency is the greatest store of statistical information about the coal industry that has ever been amassed for any industry. It was compiled in the administration of the Coal Act and in establishing minimum prices and marketing rules and regulations.

This information covers every important problem concerning the distribution and marketing of bituminous coal, including the present and potential availability of specific kinds, grades, and sizes of coal. It includes transportation charges and available or potential transportation methods and facilities. It shows the cost structure of the industry, down to each particular mine.

In addition, the Division has a staff of trained technicians, experienced in the marketing and distribution of coal.

MINIMUM PRICES NOW IN EFFECT

The Bituminous Coal Act became a law in the spring of 1937. It was not practicable for Congress to provide detailed schedules containing minimum prices for each kind, quality, and size of coal which each of the more than 13,000 producers mine and ship into the various markets they serve. This constituted a highly intricate and technical process. It required a great amount of time and a tremendous amount of work by a large force of highly skilled technicians. It was completed and the minimum prices and marketing rules were made effective on October 1, 1940.

DIVISION TOOK OVER WORK

The work of establishing the minimum prices originally was begun by the National Bituminous Coal Commission. The difficulties the Commission met are well known. The Bituminous Coal Division took over the work on July 1, 1939, pursuant to the provisions of the Reorganization Act of 1939 which abolished the Coal Commission.

The Division proceeded with the view firmly in mind that the initial price structure must be as perfect as it can be made. Although the law provides for the adjustment and alteration of minimum prices after they become effective, the importance of the prices to the coal industry, and the coal-buying public demanded that the initial schedules be carefully devised. The Division, therefore, of necessity, proceeded with great care and deliberation, but as rapidly as circumstances would permit.

At three separate stages in the procedure, the proposed price structure was published and an opportunity given for interested persons to point out their objections and seek changes. First, in the extensive public hearing which provided the basic legal record upon which the prices were established, the Division received the protests against the minimum prices proposed by the Coal Commission. The recommendations of the Division's trial examiners, who presided at the hearing, then were published. Objections to these were considered by the Division Director, in his study of the examiners' report. Then the Director's determinations were published, and objections to these were received and considered by the Secretary of the Interior. The order of the Director had provided that the prices and marketing rules were to become effective subject to review by the Secretary of Interior.

A more detailed account of the price establishment procedure will be contained elsewhere in this report.

RESULTS CANNOT YET BE RELATED

The results of the establishment and making effective of minimum prices and marketing rules, of course, cannot be forecast with certainty until more experience is had thereunder.

The Division now has entered upon a new phase of its work. Its activities will be concentrated on insuring compliance with the minimum prices and marketing rules and making such adjustments in them as may be required from time to time.

To meet the demands of this new phase of its work, the Division has changed the basic organization of its staff. The task of securing compliance with the minimum prices for coal at the mines and of preventing unfair trade practices involves the use of personnel in both the producing and consuming areas. To provide for the cooperation of the district boards with the Division in compliance, special arrangements have been made for the interchange of information and investigation. The district boards have with substantial unanimity offered their assistance.

Proper investigation of alleged violations and consideration of requests for substitution permits will require study of invoices and

the compilation and study of machine runs of abstracted invoices. The statistical work, also necessary in connection with appropriate disposition of petitions for revision of prices, may be expected to equal the amount of work entailed in the establishment of prices.

Although the price schedules have been made effective, they cannot be considered as a static, accomplished task requiring no further adjustment. To a degree even greater than the freight-rate structure of the Nation, they will require constant attention to meet changing conditions, including changes in methods of transportation.

INDUSTRY COOPERATES

The Division has every reason to believe it will meet with even more cooperation from the coal industry in the compliance program than it has received in the formulation of the prices.

The Division must constantly seek to ascertain the extent to which the individual units of the coal industry are complying with the prices and marketing rules through analysis of the copies of invoices, credit and other sales memoranda and data which producers are required to file.

Complaints, charging violation of the minimum prices, will be received in the field offices, and promptly investigated either by the Division's investigators or those of the producers' boards, or both.

BOARDS' PART IMPORTANT

The bituminous coal producers' boards, whose membership consists of representatives of the coal industry and labor, will play an important part in the compliance program, just as they played in the price formulation program. Not only will they continue to play a part in the pricing process from time to time, and discharge other duties as provided by the Coal Act, but they will cooperate in the filing of and investigation of complaints charging violations of the minimum prices. This will not, however, relieve the Division's field force of its investigatory duties.

Machinery has been set up for the holding of public hearings on complaints charging violations. Public hearings also will be necessary from time to time in carrying out other functions in administration of the Coal Act, including the making of adjustments in the minimum price structure when necessary under section 4 II (d) of the Coal Act. Such hearings will continue to necessitate the compilation of much statistical data as in the past.

The Division must maintain a close watch on the costs of the coal industry, as the Coal Act requires that adjustments in the prices be made upon satisfactory proof that the weighted average costs of producing and selling coal have changed as much as 2 cents a ton.

SUBSTITUTIONS ARE PROVIDED

Many problems must be met in the administration of the minimum prices and the Marketing Rules and Regulations. For example, there is the problem of handling substitutions, i. e., the filling of an order or contract for the sale or delivery of coal by a grade, size, quality, preparation or treatment of coal which takes a higher minimum price than that specified in the order or contract. In the operation of a coal mine it occasionally becomes necessary to substitute a different coal from that which has been ordered. This may be due to congestion of loaded railroad cars at a producer's tipple, requiring immediate shipment of certain coals in order to permit the continued operation of the mine. A similar emergency may arise when unordered coal is produced or is about to be produced as a consequence of the production of coal to fill orders for certain sizes. A peculiarity of the business of mining coal is that a producer cannot control production so as to produce a single size of coal for which he may have orders. Coal must be blasted out of its natural geological formation or mined with such heavy machinery that all kinds of sizes result from the mining operation. Substitutions are not permitted by the Marketing Rules and Regulations, except in certain instances and in accordance with a definite procedure. This procedure requires that substitutions may not be made unless an application for a substitution permit has been filed with the statistical bureau of the district and a substitution permit issued after approval by the Director or his designated representative.

TWELVE THOUSAND THREE HUNDRED CODE MEMBERS

The minimum prices and marketing rules apply to the coal sold by producers who have become members of the Bituminous Coal Code. More than 12,300 producers who mine substantially all of the bituminous coal produced in the United States have become code members.

Before prices became effective there were only a few producers throughout the country who had not become members. Although their combined production has not been computed, it is estimated to be insignificant. Its effect in the coal market will be negligible. Such producers may sell coal at whatever prices they choose, but the Coal Act levies a 19½-percent tax on each sale.

Code members must sell their coal at not less than the established minimum prices and in accordance with the Marketing Rules and Regulations. Failure to do so will subject a code member to loss of code membership, in which case his sales of coal will be taxed 19½ percent, payable to the United States Treasury. To regain

his code membership he must pay double the 19½-percent tax of the sales price on all coal sold in violation. Furthermore, if a code member's violation results in injury to the business or property of another code member, the latter is entitled to recover triple damages in a suit brought in any court of competent jurisdiction. As an alternative to code revocation, the Division, through its Director, may issue a cease and desist order against a code member violator which, if not obeyed, is enforceable by any Circuit Court of Appeals or the Court of Appeals for the District of Columbia upon application by the Division. A producer whose code membership has been revoked may not be a member of a marketing agency and thus cannot participate in voluntary cooperative marketing agreements in accordance with section 12 of the act.

SALES AGENTS GOVERNED

Sales of coal by code members through their sales agents are governed by the Marketing Rules and Regulations. These are designed to insure that sales agents observe the minimum prices and all other applicable rules and orders. If a code member fails to require his sales agent to abide by the established minimum prices or the Marketing Rules and Regulations, he commits a violation of the code and becomes liable to the applicable penalties. If a sales agent does not agree to conform to and observe the applicable provisions of the Marketing Rules and Regulations, the act, proper orders of the Division and the established minimum prices, or fails to comply with such an agreement, he cannot be allowed or paid a commission by a code member.

The marketing of coal through distributors and farmers' cooperative associations also is regulated. Code members may grant discounts from the minimum prices only to distributors and farmers' cooperatives which have been registered by the Division.

Registered distributors and cooperatives are required to sell coal at not less than the minimum prices established. The Division, after conducting a public hearing, prescribed the maximum discounts which code members may make to registered distributors and farmers' cooperatives, and promulgated rules and regulations for their registration.

Regional marketing agencies, which may be approved by the Division under section 12 of the Coal Act, also are required to sell the coal of their members at not less than minimum prices. The Division has granted provisional approval to 13 of these agencies.

THIRTY-NINE EXEMPTIONS GRANTED

Under provision of the Coal Act, exemptions from the minimum price regulations have been granted in 39 cases in which the coal is consumed by the producer.

The regulatory provisions of the law do not apply to bona fide written contracts entered into prior to June 16, 1933. The Division required all such contracts to be filed with it, and made a careful investigation in each case to ascertain whether the contract in question was a lawful and bona fide written contract entered into prior to June 16, 1933.

PROCEEDINGS FOR ESTABLISHMENT OF MINIMUM PRICES AND MARKETING RULES AND REGULATIONS

As previously stated, the means adopted by Congress to stabilize the coal industry is through a system of minimum prices, f. o. b. transportation facilities at the mines applicable to code members in the sale of their coal. The minimum prices are supplemented by standards of fair competition which must be observed by code members and by rules and regulations governing the marketing of coal.

The prices have been established after full hearings for all concerned. This procedure, as well as the complex nature of the task, made the process of determining prices a slow one.

PROCEEDINGS INSTITUTED BY THE COMMISSION

In order to meet, with the greatest dispatch, the critical situation existing in the coal industry, minimum prices were established by the Commission in December 1937. However, these prices were revoked by the Commission in February 1938 after the Court of Appeals for the District of Columbia had issued certain temporary restraining orders, which threatened a general break-down in the price structure. The court stated, without finally deciding, that the required opportunity to be heard had not been given before these prices were made final. Detailed hearings in General Docket No. 15 on all the phases of the price-fixing process were then begun as soon as possible. The time consumed in the various phases of the proceedings is attributable to the magnitude of the task, to the care which has been taken to assure the correctness of the result, to complex procedural requirements of the law, and to litigation instituted during the proceedings. Moreover, in all the hearings full opportunity was given to all district boards, all producers, and the Consumers' Counsel, as well as all other interested parties, to offer evidence and proposals of their own and to cross-examine all witnesses.

The fixing of prices may be classified in three phases: First, the weighted average of the total costs of the ascertainable tonnage in each of the minimum-price areas is determined; second, minimum prices and marketing rules and regulations are determined in conformity with standards set forth in the act to serve as a basis for coordination among the districts; third, these minimum prices and marketing rules and regulations are coordinated in common markets in accordance with the standards set forth in subsections (a) and (b) of part II, section 4, of the act and become the effective minimum prices and marketing rules and regulations.

At the time of its abolition on July 1, 1939, the Commission had completed proceedings for the determination of the weighted average cost of production and sale; it also had completed the proceedings concerning the determination of minimum prices and marketing rules and regulations to serve as a basis for coordination among the districts; it had not completed the task of coordination of these prices and rules.

CONTINUATION OF PROCEEDINGS BY THE DIVISION

Final hearings on coordinated minimum prices were begun by the Commission in May of 1939 and were continued before examiners of the Division commencing July 24, 1939, and lasting until January 20, 1940.

A detailed account of these proceedings from the beginning of General Docket No. 15, up to and including the phases completed and in progress as of November 1939, is contained in Third Annual Report under the Bituminous Coal Act of 1937 (U. S. Government Printing Office, Washington, 1940).

EXAMINER'S REPORT—EXCEPTIONS THERETO AND ARGUMENT BEFORE DIRECTOR

The taking of testimony before the examiners of the Division in General Docket No. 15 was concluded on January 20, 1940. The record of these proceedings contains over 26,000 pages of testimony and oral argument, about 2,000 exhibits, about 700 written protests and 112 briefs. More than 300 producers, consumers, and other interested persons were represented at the hearing. The examiners heard oral argument on February 14, 15, and 16, 1940. They filed part of their report on March 21, 1940, and the remainder on April 13, 1940.

Five hundred and eighty-one parties filed exceptions and briefs to the examiner's report. Forty-eight parties requested a review by the Director of the findings and conclusions of the Commission on vari-

ous phases of the proceedings. Nearly 300 parties were afforded oral argument before the Director during the period from May 27 to June 6, 1940. Several miscellaneous motions and other moving papers were filed by parties subsequent to the filing of the examiner's report.

ESTABLISHMENT OF MINIMUM PRICES AND MARKETING RULES AND REGULATIONS

On August 8, 1940, the Director, having made findings of fact and conclusions of law, established minimum prices as set forth in schedules which had previously been mailed to appropriate persons by August 3, 1940. These prices were to become effective on September 3, 1940, together with Marketing Rules and Regulations and schedule of common consuming market areas.

REVIEW BY SECRETARY OF THE INTERIOR

Under rules of procedure promulgated by the Director, with the approval of the Secretary of the Interior, interested parties were afforded a period of 10 days from the date of issuance of the Director's findings of fact and conclusions of law to file with the Secretary of the Interior exceptions thereto and a request for review of the Commission's findings and conclusions.

Several parties filed motions with the Secretary requesting that the period within which to file exceptions be extended for certain periods of time. The Secretary extended this period to August 30, 1940. In view of this action the Director postponed the effective date of the minimum prices and marketing rules and regulations until October 1, 1940.

More than 100 parties filed with the Secretary exceptions to the Director's findings of fact and conclusions of law. There were several requests filed for a review of various phases of the Commission's findings and conclusions and other relief.

EFFECTIVE DATE OF MINIMUM PRICES AND MARKETING RULES AND REGULATIONS

Prior to October 1, 1940, the Secretary had passed upon the exceptions and requests for review. The minimum prices and marketing rules and regulations went into effect on October 1, 1940. As this report was going to press, the Division was engaged in receiving, passing upon, and hearing petitions filed in accordance with section 4 II (d) of the act, by interested parties, who were dissatisfied with the minimum prices or marketing rules and regulations. Under this section of the act temporary relief may be afforded to an interested

party, upon a proper showing and pending final disposition of a petition. During the brief period from December 16, 1937, to February 25, 1938, when minimum prices were formerly in effect, more than 300 of these petitions were received by the Commission.

CONSTITUTIONALITY OF THE ACT

On May 20, 1940, the Supreme Court of the United States, with Mr. Justice McReynolds dissenting, declared that the Coal Act was constitutional in the case of *Sunshine Anthracite Coal Company v. Adkins* (60 Sup. Ct. S. C. 907). This case involved a suit by a non-code-member producer, originally filed in a three-judge statutory Federal district in Arkansas, to enjoin the collection of the 19½ percent excise tax. The Sunshine Co. asserted that its coal was not bituminous within section 17 (b) of the Coal Act and that even if it were the collection of the tax should be enjoined since the act was unconstitutional. (Subsequent to the filing of this suit the Circuit Court of Appeals for the Eighth Circuit had ruled in a separate proceeding that the company's coal was bituminous and the Supreme Court denied certiorari.)

Some of the important points in the opinion of the Supreme Court are as follows:

1. Constitutionality of Regulatory Provisions

(a) *Power under the commerce clause.*—The opinion holds the various regulatory (code) provisions of the Coal Act, limited to sales in or intimately affecting interstate commerce, to be within the power of Congress to regulate interstate commerce. "The fixing of prices, the proscription of unfair trade practices, the establishment of marketing rules respecting such sales of bituminous coal constitute regulations within the competence of Congress under the commerce clause."

(b) *Due process.*—The opinion holds that price control is a means available to Congress "for the protection and promotion of the welfare of the economy." The opinion states that conditions in the coal industry were certainly so chaotic as to justify Federal intervention, and that Congress, in undertaking regulation, could fashion a flexible remedy and stabilize the industry through price-fixing by an administrative agency safeguarding the public interest.

(c) *Delegation of legislative power as to price-fixing.*—The Court considered the standards set forth in the act, both as to minimum and as to maximum prices, and upheld these standards as being sufficiently specific and definite to guide administrative action. The Court stated that the language was clearly sufficient for experts. The Court gave fresh doctrinal impetus toward permitting delegation by stating that a requirement of greater specificity would intrude upon the administrative process.

2. Validity of the 19½ Percent Tax Provision

To the objection that the 19½ percent tax imposed under section 3 (b) of the act is a penalty and not a tax, the Court stated that although the tax is not imposed for revenue purposes, but to compel compliance with the regulatory

provisions, Congress could use the power of taxation as a means of enforcing provisions valid under the commerce clause.

The company argued that the act should be construed so that the 19½ percent tax was not applicable to noncode members. The Court rejected this strained construction, and held the tax applicable to precisely the noncode members.

The company objected, in the alternative, to the "discrimination" in laying the 19½ per cent tax on noncode members but not upon code members. The Court pointed out that this distinction was the very scheme of the act, and that the Government could always discriminate against (i. e., penalize) persons not complying with regulations.

3. Status of Sunshine Coal as Bituminous

The Sunshine Anthracite Coal Co. filed a petition for review in the Circuit Court of Appeals for the Eighth Circuit, claiming that the determination of the Commission that its coal was "bituminous" was erroneous and beyond the jurisdiction of the Commission. The circuit court of appeals upheld the jurisdiction of the Commission to determine that issue, and held that its findings was supported by substantial evidence. The Supreme Court denied certiorari.

In this suit, brought to enjoin the Collector of Internal Revenue from collecting the 19½ percent tax, the company contended that the former decision was not binding, since the parties were different, and since this case presented a different issue, one of tax liability.

The Supreme Court decided in favor of the Government on various grounds. First, the Court said that the Coal Commission is the agency designated to determine what coal is subject to the act, and that the Commissioner of Internal Revenue is merely an agent of tax collection. The Court also held that the first decision was binding and conclusive of this "bituminous issue" in the second proceeding, on the ground that the issues were the same and the parties were the same in substance, if not in form. The Court pointed out that the Coal Commission had authority to represent the interests of the United States in the first proceeding, and that, therefore, the question could not be relitigated against another subordinate official of the United States. Finally, the Court held that there was no jurisdiction to consider the "bituminous issue" on a suit for injunction, since the statutory remedy (of appeal to the circuit court of appeals) is exclusive. The ground as stated is extremely significant with respect to the administration of the Coal Act, since it limits any judicial review of the Division's orders to the circuit courts of appeals, and precludes litigation in the various district courts.

4. Injunction

The lower court issued a permanent injunction against the collection of taxes accruing prior to December 4, 1939, but did not extend that injunction. The company argued that it was entitled to contest the constitutionality of the act without being subject to a heavy penalty during the period of litigation. The Supreme Court stated that such relief against payment of the taxes "until final termination of the litigation would be to put a premium on dilatory tactics" in a situation where constitutionality was clear.

OTHER LITIGATION

During the period covered by this report, every case brought to conclusion in the courts has been decided in favor of the Division.

In the case of *City of Atlanta v. National Bituminous Coal Commission* (60 Sup. Ct. 170) the Supreme Court on November 13, 1940, in a per curiam opinion, affirmed the judgment of the lower court, holding that the appellant was without standing to maintain the suit.

This case had originated in a suit before a three-judge statutory court in the United States District Court for the District of Columbia. The city of Atlanta assailed the constitutionality of the Bituminous Coal Act of 1937 and prayed that the Commission be enjoined from establishing minimum prices on the coals sold to it and further prayed a declaratory judgment announcing the legal rights of the parties under the act.

The district court dismissed the bill of complaint. It assumed that the constitutional question was properly presented, and upheld the constitutionality of the Coal Act. The court held that the power to regulate interstate commerce embraced the authority to establish the price of commodities sold in interstate commerce; that Congress had not violated the due-process clause by providing for the fixing of prices in the coal industry, an industry of fundamental importance and characterized by chaotic marketing conditions; that the standards provided by the act were not constitutionally defective as indefinite; and that the act could be applied to sales of coal to the city of Atlanta without infringing on its sovereign powers contrary to the tenth amendment.

Upon direct appeal to the Supreme Court, the Government supported the constitutionality of the act, and also renewed its initial objections; that the suit was premature since prices had not been fixed; that there was no equity jurisdiction since the act itself provided plaintiff with an adequate remedy; and that the plaintiff was merely a consumer of coal and therefore had no standing to attack the Coal Act which imposes sanctions only upon producers of coal.

The case of *Winslow Coal Corporation v. Smith*, decided April 12, 1940, by a three-judge statutory court convened in the District Court of the United States for the Southern District of Indiana, also involved the constitutionality of the act.

In this proceeding a suit was brought by the Winslow Coal Corporation against Will H. Smith, as Collector of Internal Revenue for the District of Indiana, in which an injunction was asked against the collector to restrain him from collecting the taxes imposed by sections 3 (a) and (b) of the act upon the plaintiff, a producer of coal, on the ground that the act was unconstitutional.

The court sustained a motion for summary judgment filed by the Government and dismissed the complaint, holding that the 1 cent per net ton excise tax imposed by section 3 (a) of the act

constituted a valid excise tax, and that it was without power to grant an injunction against the collection of the tax provided in section 3 (a) of the act.

As indicated above, an important case was brought to a conclusion by the Supreme Court of the United States, when it denied certiorari on November 6, 1939, in the case of *Sunshine Anthracite Coal Co. v. Ickes, et al.* (60 Sup. Ct. 142), and refused rehearing on December 4, 1939 (60 Sup. Ct. 260). The petition for certiorari was filed by the Sunshine Co. seeking a review of the decision of the Circuit Court of Appeals for the Eight Circuit in upholding the Commission's determination that certain coal was bituminous within section 17 (b), in *Sunshine Anthracite Coal Co. v. National Bituminous Coal Commission* (105 F. (2d) 559), decided June 19, 1939.

The petition for review in the *Sunshine case* was filed by a non-code-member producer who claimed that its coal was not bituminous and also claimed that this question was one for decision by the courts and not the Commission.

The court held that sections 2 (a) and 4-A of the act constituted authority for the Commission's regulations, providing for an ascertainment of the status of coals, and established the Commission's jurisdiction to determine whether coals are subject to the act. The court also upheld the Commission's refusal, under the circumstances present, to permit the producer to withdraw its application for exemption. Upon the merits, the court affirmed the Commission's finding that the coal was bituminous, and upheld the Commission's order as being supported by substantial evidence.

The above case, *Sunshine Anthracite Coal Co. v. Ickes*, is one of several cases involving applications for exemption filed by producers, on various grounds, e. g., that the coal is captive coal, being consumed by its producer, that it moves in intrastate commerce, that it is not bituminous, etc. The act contemplates that judicial consideration of the validity of the Commission's denial of exemption will be obtained by filing a petition to review in the appropriate Circuit Court of Appeals, pursuant to section 4-A and section 6 (b) of the act.

Another exemption case, *Northwestern Improvement Company, Petitioner, v. Ickes, et al.* (111 F. (2d) 221), decided April 25, 1940, by the Circuit Court of Appeals for the Eight Circuit, was resolved favorably to the Government. The petitioner was unsuccessful in its claim that there is no interstate commerce in coal, or commerce covered by the Coal Act, in its sales to its parent company, the Northern Pacific Railway Co., on the ground that title to the coal passes within the State where the mine is located and that thereafter the

coal is transported by the consumer thereof. The petitioner did not seek a review of this decision.

Two cases, *Cook v. Yoke* and *Craig v. Yoke*, in the District Court of the United States for the Northern District of West Virginia were dismissed by stipulation on May 17, 1940. These cases were brought by noncode members who contested the application of the act to their intrastate sales within the State of West Virginia. After filing these suits the producers decided to accept the code and the producers and the Government mutually agreed to dismiss the suits.

PENDING AND PROSPECTIVE LITIGATION

With the exception of two cases involving denial of applications for exemption, the Division, by September 15, 1940, was clear of all litigation with which it had to contend during its first year of the administration of the Coal Act. During this period 7 cases were disposed of, all favorably to the Government. It is expected, however, that a considerable amount of litigation will arise as a result of interested persons seeking court review of various matters involved in the establishment of minimum prices and other proceedings relating thereto. The number of such cases cannot be foretold at this time; about 25 cases were filed attacking the first price structure established by the Commission on December 16, 1937, and in effect only until February 25, 1938.

BOARD ON GEOGRAPHICAL NAMES

George C. Martin, *Executive Secretary*

THE UNITED STATES BOARD ON GEOGRAPHICAL NAMES is the organization through which the Federal Government provides for uniform usage in the form, spelling, and application of those geographic names that are used on maps and charts and in publications issued by the Government.

The Board is continuing work begun in 1890, when an informal interdepartmental committee was organized for the purpose of bringing about uniformity in geographic names used in the publications of the bureaus represented. That committee was given legal status in 1890, when President Harrison designated its members as a Board on Geographic Names and defined its authority. The name of the organization was changed in 1906 to the United States Geographic Board. It operated under that name until 1934, when its functions were transferred to the Department of the Interior.

The Board consists of an advisory committee, in which various governmental departments and geographic societies are represented, which acts chiefly through its executive committee, and of an administrative and investigative unit, called the Division of Geographic Names, in the office of the Secretary of the Interior. The personnel of the advisory and executive committees, on June 30, 1940, was as follows:

ADVISORY COMMITTEE

Lt. Comdr. K. T. Adams, Coast and Geodetic Survey, Department of Commerce.
Mr. Roscoe E. Baber, foreign language editor and translator, member Style Board, Government Printing Office.

Mr. Clarence Batschelet, geographer, Bureau of the Census, Department of Commerce.

Mr. James M. Darley, chief cartographer, National Geographic Society.

Mr. E. E. Carter, Chief, Division of Timber Management, Forest Service, United States Department of Agriculture.

Mr. William J. Dixon, superintendent, Division of Postmasters, Post Office Department.

Dr. William H. Haas, professor of geology and geography, Northwestern University, representing the Geographic Society of Chicago.

Commander Henry Hartley, officer in charge, Division of Maritime Security, Office of the Hydrographer, Navy Department.

Mr. W. L. G. Joerg, Chief, Division of Maps and Charts, The National Archives.

Lt. Col. Lawrence Martin, Chief, Division of Maps, and Incumbent, Chair of Geography, Library of Congress.

Dr. W. C. Mendenhall, Director, Geological Survey, United States Department of the Interior.

Mr. Raye R. Platt, research associate American Geographical Society of New York.

Mrs. Sophia A. Saucerman, assistant geographer, Department of State.

Dr. John R. Swanton, Bureau of American Ethnology, Smithsonian Institution.

Dr. Frank E. Williams, professor of geography, Wharton School of Finance and Commerce, University of Pennsylvania, representing the Geographical Society of Philadelphia.

EXECUTIVE COMMITTEE

Mr. W. L. G. Joerg, *Chairman*

Mr. E. E. Carter

Lt. Comdr. K. T. Adams

The advisory committee held two meetings during the year, at which matters of general policy and reports of interim action by the executive committee and by the executive secretary were considered. The executive committee held 18 meetings at which 501 names were approved. Decisions on those names are included in a pamphlet entitled "Decisions of the United States Board on Geographical Names rendered between July 1, 1939, and June 30, 1940," which can be obtained from the Board without charge.

The locations of the features on the names of which decisions were rendered, and the sources of the requests for decisions, are as follows:

Geographic Distribution of Names

Virginia-----	198	California-----	8	Minnesota-North	
Montana-----	94	Colorado-----	5	Dakota-----	1
Wisconsin-----	82	Alaska-----	3	Mississippi-----	1
Washington-----	38	Arizona-----	2	New York-----	1
Florida-----	14	Antarctica-----	2	Ohio-----	1
Oregon-----	13	Puerto Rico-----	2	Oklahoma-----	1
Maine-----	11	Delaware-----	2	Tennessee-----	1
Maryland-----	10	Minnesota-----	1		
Texas-----	10			Total-----	501

Sources of Requests for Decisions

U. S. Coast and Geodetic Survey--	237	United States Hydrographic	
National Park Service-----	94	Office-----	2
State organizations-----	89	Bureau of Agricultural Eco-	
United States Forest Service-----	55	nomics-----	2
United States Geological Survey--	19		
War Department-----	3	Total-----	501

WAR MINERALS RELIEF COMMISSION

A. J. Barber, Acting Commissioner

After the World War, Congress recognized a moral obligation to reimburse operators who had been specially stimulated by the request or demand of the Government for net losses incurred in preparations to produce and production of four designated war minerals—tungsten, chrome, manganese, and pyrites. As a consequence, the Congress enacted the so-called War Minerals Relief Act as section 5 of the act of March 2, 1919 (40 Stat. 1272), directing the Secretary of the Interior to administer its provisions. The Secretary of the Interior appointed the War Minerals Relief Commission to organize a staff to examine into the claims filed under the act, and to recommend proper awards for net losses.

Congress amended the act on November 23, 1921 (42 Stat. 322); February 13, 1929 (45 Stat. 1166); May 18, 1936 (49 Stat. 1355); and June 30, 1936 (49 Stat. 2040); each time reopening for review claims that had been filed pursuant to the original act, but without permitting the filing of any new claims.

The work of the War Minerals Relief Commission was suspended during the fiscal year July 1, 1938, to June 30, 1939, for failure of Congress to provide funds for administrative expenses. However, Congress included \$11,200 in the Interior Department Appropriation Act approved May 10, 1939, for the administrative expenses of the Commission for the fiscal year 1939–40. and as a result thereof the work of the Commission was resumed July 1, 1939.

REVIEW OF WORK

At the beginning of the period under review the number of claims under the acts of February 13, 1929, May 18, 1936, and June 30, 1936, totaled 242. Taking into account changes in status and the adjustments and recommendations made by the Commission, 146 claims were disposed of during the fiscal year leaving a total of 96 claims pending adjustment on June 30, 1940.

It is provided in the Interior Department Appropriation Act for the fiscal year ending June 30, 1941, that any claim that has not been

prosecuted and disposed of prior to July 1, 1941, shall not thereafter be considered by the Secretary of the Interior and shall be barred.

I. ACT OF FEBRUARY 13, 1929

Within the period under review the District Court of the United States for the District of Columbia dismissed one case; abated 9 cases; vacated a previous order in one case; and entered 5 decrees.

The Commission adjusted 19 claims under decrees and made recommendations therein to the Secretary of the Interior who made 16 awards totaling \$16,490.59, and denied 3 claims.

There remain under this act seven cases pending in the Court and eight claims under decree from the Court pending in the Commission, for consideration during the fiscal year ending June 30, 1941. One claim, in which a recommendation for denial was made in June 1938, is pending before the Secretary.

II. ACT OF MAY 18, 1936

Within the period under review 40 claims were disposed of by the Commission; 15 by recommendations for awards totaling \$125,068.99; 19 by recommendations for denial of awards; 5 applications for review were withdrawn; and one claim was rejected for improper filing.

The Secretary made 11 awards, totaling \$95,804.07, and denied 17 claims. Recommendations by the Commission for 4 awards totaling \$29,264.92, and for 2 denials are pending approval by the Secretary.

A total of 17 claims are pending review by the Secretary of the Interior, 12 in the Commission and 5 cases in court.

The Act of May 18, 1936, authorized a limited sum of \$1,250,000 for payment of claims thereunder. At the beginning of the fiscal year the balance of the authorized limitation was \$130,342.09. After payment of the awards totaling \$95,804.07, the amount remaining under the authorization was \$34,538.02; allocation of the amounts recommended, but not yet awarded, will, when certified, reduce the authorized limitation to \$5,273.10, as of June 30, 1940.

III. ACT OF JUNE 30, 1936

Within the period of review the Commission considered and made recommendations for awards, totaling \$61,500.06, in 27 claims, and made recommendations for the denial of 25 claims. The Secretary of the Interior made 22 awards totaling \$56,333.57 and denied 23 claims. Recommendations to award \$5,166.49 in 5 claims and to deny 2 claims are pending approval by the Secretary. Claimants withdrew 17 claims and the Commission rejected one claim for improper filing.

Certification of the awards are made to the General Accounting Office. When the claims are allowed, the amounts are then certified by the General Accounting Office to the Treasury Department, and payment of the amounts certified is made when money is made available through deficiency appropriations.

SUMMARY

Total amounts claimed exceed \$687,726.06; the exact figure cannot be determined for the reason that the amount claimed is indefinitely stated in many claims.

Awards made and certified for payment:

Act of February 13, 1929-----	\$16,490.59
Act of May 18, 1936-----	95,804.07
Act of June 30, 1936-----	56,333.57
Total-----	<u>168,628.23</u>

Recommendations for awards, pending:

Act of May 18, 1936-----	29,264.92
Act of June 30, 1936-----	5,166.49
Total-----	<u>34,431.41</u>
Total-----	<u>203,059.64</u>

Number of claims pending in court and before the Secretary of the Interior, June 30, 1940:

Act of February 13, 1929-----	15
Act of May 18, 1936-----	17
Act of June 30, 1936-----	64

Number of claims pending----- 96

NOTE.—This total may be subject to slight changes.

DIVISION OF INFORMATION

Michael W. Straus, *Director*

THE increasing popular interest in Federal conservation activities was reflected in the demands made upon the Division of Information during the past fiscal year. To keep abreast of the significant growth in inquiries, the Division carried forward its program of information about the Department's operations by means of the printed word, the radio, and photography.

Rising public consciousness of natural resource values permitted the Division to approach its objectives of securing popular compliance with the conservation policies laid down by Congress through education in preference to regulation or policing. Education has established itself not only as a more acceptable way for the Department to discharge its conservation responsibilities, when feasible, than placing enforcement agents in the field and litigation, but also has proved less expensive. In its educational program the Division has sought, with considerable success, to use the media of established private publications, radio stations, newspapers and periodicals of wide circulation for dissemination of information instead of performing that task directly at multiplied expense.

Established in 1938 as the medium through which authentic official information concerning the activities of the many bureaus and field agencies of the Department might easily be made available for the public, the Division is comprised of an editorial, radio, photographic, and publications section.

The editorial section issued 844 public announcements during the year, reporting to the public on operations of the 25 separate agencies of the Department. In addition, it prepared or assisted in the preparation of various public reports of the Department and its agencies and handled a vast number of direct inquiries concerning such work.

Preparation of "Current Conservation," a monthly clip sheet for newspapers containing news items in the field of conservation, was continued by the Division during the year. This publication, now in its third year of issue, has met with popular approval as indicated by the fact that in an annual circularization of its subscriber list, not one response requested its discontinuance.

RADIO SECTION

One hundred and thirty-seven thousand five hundred and sixty-three citizens made written request to the Radio Section for information on Conservation as a direct result of radio broadcasts produced by the Section during the fiscal year. One hundred conservation broadcasts were made possible by cooperation of all major networks and stations who contributed radio time valued at more than \$100,000, and in addition defrayed all expenses for actors, musicians, and the like. Research and script preparation were furnished by the Radio Section.

One of the series prepared and written by the Section, "What Price America," was chosen by Whittlesey House for inclusion as among "The Best Broadcasts of 1939-40," with the citation, "Best Government Radio series of the year."

The Section also initiated the cooperation of State and local school authorities in California in an extensive program of research, planning and writing of radio programs on conservation and reclamation activities in connection with the great Central Valley Project.

A total of 18 agencies of the Federal Government outside the Department of the Interior made increasing use of the studios, personnel, and mechanical equipment administered by the Radio Section. In addition, extensive help was given to educators, schools, colleges and school systems in filling requests for conservation material for use on the air.

PHOTOGRAPHIC SECTION

The Photographic Section effectively illustrated the many and varied activities of the Department by furnishing photographic service which received wide publication.

Important photographic work of the year was coverage of the Indian reservations, proposed national parks and monuments, the bituminous coal industry, and progress work on irrigation dams. An outstanding feature was the demand for pictorial material from rotogravure sections of various newspapers and news services, with wide-spread reproduction throughout the press of the country.

Colored lantern slides and transparencies relating to national parks and reclamation projects were distributed for the use of the general public to interested groups and organizations.

Through its Motion Picture Distribution Office, the Photographic Section continued the general circulation of motion picture films illustrating the diversified functions of the various bureaus of the Department of the Interior. Additions to the motion picture library included

the films of the Bureau of Biological Survey and the Bureau of Fisheries, transferred from the Departments of Agriculture and Commerce, respectively, in the latter part of 1939.

All of these films were loaned upon request to educational institutions, civic and public organizations, and other interested groups in practically every State in the Union as well as in a number of South American countries. They have proved to be an effective means of informing the general public how it may best assist the Department of the Interior in carrying out the conservation policies laid down by Congress.

PUBLICATIONS SECTION

The Publications Section continued to serve as the liaison agency between the Government Printing Office and the Department. It prepared all requisitions for printing, maintained records and accounting systems for printing work, and served as the distributing point for publications in the Department.

OFFICE OF EXHIBITS

Harold W. Graves, *Acting Supervisor*

SINCE 1934, the Office of Exhibits has served to present to the public a visual conception of Department of the Interior activities in the preservation of natural resources and its contribution to the economic and social welfare of the American people. As a result of its operations, exhibits consisting of animated dioramas and models, relief and animated maps, murals, transparencies and charts have been installed and viewed by thousands of people daily at national and international world's fairs, state and county fairs, expositions and conventions.

Today, the Office is in a position, both from the standpoint of equipment and skill, to render valuable aid in national defense through the preparation of maps, construction of models required by the Army or Navy, and the preparation of exhibits and displays as well as painted posters for reproduction.

With the popularity of the displays evidenced by a substantial increase in the number of requests for permission to use the exhibits, the Office has on hand approximately \$75,000 worth of material which is loaned, free of charge, to groups, organizations, schools or colleges.

THE YEAR'S ACCOMPLISHMENTS

Maintaining a studio and workshop with a staff of skilled craftsmen, the Office of Exhibits, during the fiscal year 1940, designed and built approximately \$30,000 worth of new exhibit material. Included in this work was an animated diorama of Bonneville Dam and power house on the Columbia River in Washington State. An animated and illuminated map, showing the natural resources found in the four Northwestern States, as well as the opportunities for electric light and power afforded by the Bonneville project, also was prepared. In addition, two large cases containing colored transparencies illustrating the advantages of increased use of Bonneville power were furnished.

During the same year, the Office of Exhibits completed one of its largest animated dioramas for the Government of Puerto Rico at a cost of nearly \$5,000. This diorama is an exact replica in every detail of the city of San Juan and the new airport and harbor, and was installed in the Puerto Rico Building at the New York World's Fair.

The Office of Exhibits also constructed another large diorama showing the entire city of Washington. This was built for the National Capital Parks Planning Commission at a cost of \$4,800, to assist it in the planning, designing, and locating of new Federal buildings in the District of Columbia.

Two groups of four dioramas each were built for the Coronado Exposition Commission. One of these groups, to be installed as part of the permanent exhibit in the Museum at Canyon, Tex., depicts early pioneer life on the plains of West Texas, and includes representations of early ranch life, transportation, wolf hunts and Indian buffalo hunts on the plains.

The second series of dioramas for the Coronado Exposition, to be placed on display at Phoenix, Ariz., includes a reproduction of Old Fort Elliott in northern Texas; picturization of a band of soldier scouts searching for marauding Indians; an attack of a wagon train of early pioneers by Indians; and a replica of the first prairie home to be set up on the western plains.

The Office also designed and constructed an exhibit of the Bureau of Mines at the Eighth Scientific Congress held in Washington during the past year.

The use of dioramas and exhibits by the various bureaus and offices of the Department of the Interior has proven so valuable in the past, that already approximately \$27,500 worth of new material of this nature has been scheduled for the present fiscal year.

INTERIOR DEPARTMENT MUSEUM

H. L. Raul, *Museum Curator*

ESTABLISHED March 8, 1938, the Museum of the Department of the Interior has pioneered as a comprehensive governmental department museum. Designed as an historical, scientific, and educational institution, this modern museum is unique in its particular field. Popularly called an "Exposition of Conservation," the Museum visualizes and explains the history, organization, and present activities of the various bureaus of the Department.

Due to recent accessions and reclassification of the exhibits, the Museum at present contains approximately 1,300 specimens, 111 historical charts and maps, 12 large illustrated hand-painted mural maps, 75 scientific scale models, 190 interpretive oil and water-color paintings and sculptures, 9 large mural paintings, 11 historical and scientific dioramas, 389 special photographs, 12 large mural silhouettes, 11 illuminated transparencies, and numerous miscellaneous exhibits; there are approximately 1,600 explanatory labels, making a total of more than 3,700 items.

A plan for "Conducted Museum Tours" was formally inaugurated by the Secretary during the past year. These tours were popular and proved the effectiveness of trained guidance, as compared with casual museum circulation, the modern museum technique of dynamic visual education serving to inform the public of the vital responsibilities vested in the Department concerning natural resources in relation to the national defense. Conducted tours were arranged for congressional parties, educational and tourist groups. Due to frequent requests from the public for guided Museum tours ample staff assistance should be provided to make it possible to extend and enlarge this service.

During the past year, 5 original special exhibits were prepared and displayed by the Museum in collaboration with the Bureaus, covering the following subjects:

Grazing Service; Present Status of Indian Reorganization; the Work of William H. Jackson, Pioneer Government Photographer; a special exhibit for the Eighth Scientific Congress; and Geology of the Alaska Railroad Region.

These special exhibits were favorably received and have been requested by the United States Travel Bureau for further display in New York City.

An important new accession, the Colburn Collection of Indian Basketry, was the gift of Mrs. Frederick H. Colburn of San Francisco. This collection contains approximately 300 specimens of characteristic shapes, decorative designs, materials and stitches, used by various groups of Indians ranging from Alaska to the Mexican border, and including antiques of the Southwest. Many rare and valuable specimens are included in this collection.

Among the Museum betterments accomplished during the year may be listed the following: A progressive Museum program with new features introduced; new displays and case revisions; a flexible filing system devised and installed; new methods of Museum extension service established; approved methods established for care and handling of exhibits; tourist information activity in "Travel America Year" program established; assistance rendered in preparing conservation study courses for school and college classes, and establishment of an information desk reference library relating to current Departmental activities and technical reports.

The consolidation under the President's Reorganization Plan, of the Bureau of Fisheries, the Biological Survey, and the Wildlife Division of the National Park Service, now designated the Fish and Wildlife Service of the Department of the Interior, brought a highly desirable exhibit feature into the Museum. Plans comprising animated dioramas and case displays are in progress for representation of the new Service among the exhibits.

The visitor's register of the Museum contains names from every State in the Union and from the outlying Territories and island possessions. More than 40 States have been represented in a single month, and an average of 4,000 to 5,000 persons visited the Museum monthly. Systematic efforts were made to contact visiting convention delegates, schools and colleges, churches, civic organizations, and other local and national groups.

ST. ELIZABETHS HOSPITAL

Winfred Overholser, M. D., *Superintendent*

I HAVE the honor to submit herewith the annual report of St. Elizabeths Hospital for the fiscal year ending June 30, 1940.

Under the terms of Reorganization Plan IV, made effective June 30, 1940, St. Elizabeths Hospital was transferred from the Department of the Interior to the Federal Security Agency. This is, therefore, the last report of this Hospital which will be submitted to the Secretary of the Interior.

It is gratifying to record that the general state of the health of the patients was held at a high level during the past fiscal year, and that no epidemics or other catastrophes occurred. The physical plant was developed and maintained in an excellent state of repair; several administrative changes designed to improve the care of the patients were carried out; and the teaching and research programs were prosecuted vigorously.

MOVEMENT OF POPULATION

On June 30, 1940, 6,535 patients remained in the hospital as compared with 6,274 on June 30, 1939, an increase of 261.

The total number of patients under treatment during the year was 7,476, as compared with 7,024 the preceding year, an increase of 452.

The total number of admissions during the year was 1,202, as compared with 1,056 the preceding year, an increase of 146. With the exception of the year 1919, following the World War when 1,802 patients were admitted, this is the largest number of admissions recorded in the history of the hospital; 86 of the patients admitted were former patients of St. Elizabeths Hospital, and 116 others were former patients of other mental hospitals.

The total number of discharges was 619, as compared with 469 in the preceding year, an increase of 150.

The total number of deaths for the year was 322, as compared with 281 for the preceding year, an increase of 41.

The total number of discharges and deaths, combined, was 941, compared with 750 the previous year, or an increase of 191.

There were 59 burials in the hospital cemetery, as compared with 66 the preceding year, a decrease of 7. All honorably discharged service men are entitled to burial in the Arlington National Cemetery. All bodies not buried at the hospital or in the Arlington National Cemetery were taken by registered undertakers for burial in other cemeteries.

The daily average patient population was 6,395, as compared with 6,108 the preceding year, an increase of 287; 905 District patients were admitted as against 777 for the previous year, an increase of 128.

Movement of Patient Population, Fiscal Year 1940

	Male			Female			Total
	White	Colored	Total	White	Colored	Total	
Remaining on rolls June 30, 1939.....	3, 043	1, 022	4, 065	1, 389	820	2, 209	6, 274
Admitted during year ended June 30, 1940.....	565	195	760	283	159	442	1, 202
Total number under care and treatment during year ended June 30, 1940.....	3, 608	1, 217	4, 825	1, 672	979	2, 651	7, 476
Discharged as—							
Not Insane.....	10	4	14	3	0	3	17
Recovered.....	120	33	153	85	32	117	270
Improved.....	93	23	116	28	20	48	164
Unimproved.....	92	24	116	41	11	52	168
Total discharged.....	315	84	399	157	63	220	619
Died.....	120	76	196	83	43	126	322
Total of patients discharged and died.....	435	160	595	240	106	346	941
Number of patients remaining on rolls June 30, 1940.....	3, 173	1, 057	4, 230	1, 432	873	2, 305	6, 535

At the close of the year 324 patients were carried on the rolls on visit as compared with 336 on June 30, 1939, a decrease of 12 patients.

In the annual report for 1939 comment was offered to the effect that an increase of 73 colored admissions had been noted, whereas white admissions had fallen off by 46 in the preceding year. No such phenomenon is observed this year. The increase of admissions, white and colored, over 1939 was 146; a net decrease of 2 was noted in the colored, whereas 148 more white patients were admitted in 1940 than in 1939.

MEDICAL DEPARTMENT

The condition of the 225 patients who received shock therapy during 1937-39 was checked and showed the following results July 1, 1940, as compared with the results of July 1, 1939:

RESULTS OF SHOCK THERAPY IN DEMENTIA PRAECOX (202 PATIENTS)

	In hos- pital	On visit	Dis- charged	Dead
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
July 1, 1939.....	78.7	7.9	11.9	1.5
July 1, 1940.....	69.8	2.5	26.2	1.5

RESULTS OF SHOCK THERAPY IN PSYCHOSES OTHER THAN DEMENTIA PRAECOX
(23 PATIENTS)

July 1, 1939.....	52.2	39.1	8.7	0
July 1, 1940.....	47.8	17.4	34.8	0

TOTAL RESULTS (225 PATIENTS)

July 1, 1939.....	76.0	11.1	11.6	1.3
July 1, 1940.....	67.6	4.0	27.1	1.3

In the cases of dementia praecox the number of patients in the hospital was reduced by 8.9 percent. The number of patients on visit decreased by 5.4 percent and the discharged patients increased by 15 percent. The increase in discharges occurred chiefly in that group of patients who received both insulin and metrazol therapy.

In the group of patients suffering from psychoses other than dementia praecox who received shock therapy, the number of patients in the hospital was reduced by 4.4 percent. The number of patients on visit decreased by 21.7 percent and the patients discharged increased by 26.1 percent.

Of the total 225 patients who received shock therapy during 1937-39, 67.6 percent are still in the hospital.

Only two patients were given shock therapy during 1939-40. One patient is a manic-depressive depression and the other is a case of dementia praecox of the catatonic type. Both of these patients received metrazol and have shown some improvement, but are still in the hospital.

The Nurses Examining Board of the District of Columbia made an inspection of the Hospital Training School, and notified the hospital under date of April 30, 1940, that that part of the School in operation was fully accredited.

During the past year centralized nursing was established under the direction of the Director of Nursing Service. A higher general standard of nursing care of the patient resulted.

The students enrolled in the class of the Training School numbered 27 in the second year and 16 in the first year under date of June 30, 1940; there were 27 affiliate students, 12 postgraduates, and 11 affiliates

from Freedmen's Hospital, a total of 93. The 28 students in the 1941 class went on affiliation March 15, 1940 to the School of Nursing, Jersey City Medical School. One resigned to be married, leaving 27 on affiliation.

During the year 205,351 hydrotherapeutic treatments were given.

The amphitheater in B Building was remodeled and converted into a ward, with accommodations for 32 patients. The patients transferred to this ward are all untidy, semidisturbed patients, and intensive therapy along the lines of habit training and an activity program is being undertaken.

Continuous Treatment Building No. 4 was opened for use on September 15, 1939, providing beds for 186 patients. With the completion of this building the quadrangles between the buildings were enclosed with a wire fence, permitting the patients to obtain an abundance of fresh air and exercise. Through the courtesy of the Red Cross they have been provided with indoor baseballs and footballs which add materially to the enjoyment of their recreation.

A barber shop in the basement of Center Building was completed in October 1939.

The activities of the services of the Medical and Surgical Department again increased over that of any previous year. This was due to increase in ward admissions and to the number of patients admitted to the clinics.

On the first of January 1940 a new system of daily reports was inaugurated in the service, designed to give certain statistical information demanded periodically of the hospital by various national medical organizations. Such information concerns the number of patient days, average days stay, daily average of patients, etc., for each diagnostic classification, as well as for total census. The 6 months from January to June 30, 1940, under this system, showed 1,107 patients admitted with an average days stay of 26.1, and daily average number of patients in the Medical and Surgical Building of 177.7.

The principal work of interest in the medical service during the past year was in connection with a pneumonia epidemic during the winter months. The principal therapy used, supported by the usual measures, was the new drug sulfapyridine. In a few cases selected for special reasons this was combined with antipneumococcus serum. The epidemic presented both the lobar and bronchial types of pneumonia, the latter being slightly more preponderant, and the result of the therapy in both types was extremely satisfactory. In addition to a definite lowering of mortality the principal effect was to shorten the course of the disease materially.

During the year 21,633 patients visited the various clinics in the Medical and Surgical Service, and the number of clinic visits was 43,317.

Members of both the clinical and laboratory staff have taken part in research work. The following studies have been carried out; some of them completed and formulated in papers:

1. Dr. R. H. Guthrie: A clinical and anatomopathological study of cases with cerebral arteriosclerosis (completed).
2. Dr. J. Showalter: Pituitary tumors; the role of tuberculosis and lues in etiology (completed).
3. Dr. Laura Ehrlich: Brain tumor, a clinical and pathological study.
4. Dr. Frank Tartaglino: Mental disorders following administration of sulfanilamide.
5. Drs. Cruvant, Silverberg, and Katzenelbogen: The distribution of sulfanilamide between blood and cerebrospinal fluid.
6. Drs. Louis Cohen, Morrow, and Katzenelbogen: Study of patients with post-encephalitic sequelae, with special reference to mental disorders.
7. Drs. Simon and Morrow: Treatment of post-encephalitic disorders with Rabellon.
8. Dr. Perlson: Delirium, mainly comprehensive review of the literature.
9. Dr. Weickhardt: Manic-depressive psychosis, mainly comprehensive review of the literature.
10. Dr. Fong: Therapeutic quartan malaria in the therapy of neurosyphilis among Negroes.
11. Drs. Ratcliffe and Katzenelbogen: The urinary elimination of phenolphthalein injected into the cerebrospinal canal.
12. Drs. Cohn, Langenstrass, and Katzenelbogen, and Miss Neumann: Pharmacological shock therapy, insulin and metrazol studies in cats (completed).
13. Drs. Cohn and Katzenelbogen: Electroencephalographic studies in mute schizophrenic patients who received sodium amytal intravenously.
14. Dr. Cohn: Electroencephalographic studies in parietic patients.
15. Drs. Cohn and Katzenelbogen: Electroencephalographic studies in schizophrenic patients with emphasis on relationship between changes in clinical condition and those in the brain waves.
16. Dr. Cohn: Electroencephalographic studies in morphium addicts.
17. Dr. Cohn: Electroencephalographic studies in normals.
18. Dr. Katzenelbogen and Laboratory Staff: Biochemical studies in schizophrenic patients. Determination of lipids and minerals in both arterial and venous blood. In this work we are helped by Dr. Haws, who obtains the specimens of blood from the internal jugular vein and femoral artery. Our research activities in which the Division of Biochemistry, and electroencephalography and histopathology took part were greatly facilitated by the fund donated by the Supreme Council, 33° Scottish Rite Masons, of the Northern Jurisdiction, U. S. A. This fund permitted us to acquire equipment and chemicals and to pay salaries to a full-time biochemist and a part-time technician in histopathology.

Libraries.—The Medical Library received the addition of 105 books purchased, 27 of which went for the nurses' collection. Twenty-eight books transferred from the Training School, and 1,624 books given by the widow of the former superintendent, Dr. William A. White. This last collection will be set apart as the Dr. William A. White Library. During the year the library received periodicals as follows: By hospital subscription, 49 American, 9 English, 6 German, and 2 French, free articles received 19, a total of 85. Due to the present war in Europe there has been some irregularity in the reception of foreign periodicals.

During the year 804 volumes were added to the Patients' Library. The total number of books on hand is 18,337, and 36 popular magazines and 5 newspapers, daily and Sunday, were regularly received. Over 300 books are drawn daily and approximately 3,800 books are in constant circulation, two-thirds of which are fiction.

Social service.—The total number of patients supervised by the Social Service during the year was 415.

Out-patient service.—A psychiatric follow-up clinic should be organized for patients who have been released from St. Elizabeths Hospital. Plans are now under way to establish such an out-patient department on an informal basis. It is hoped that statutory authority for such an activity may be secured. This lack of an out-patient department is probably the only respect in which the Hospital fails to meet the ideal requirements set by the American Psychiatric Association. A psychiatric out-patient department for the purpose of following patients who have been released from the hospital would not only render a service to the hospital patients but perhaps result in a saving to the District, and possibly a more liberal policy with regard to the release of patients and would be feasible if provision should be made for their nominal psychiatric supervision in the community.

Red Cross.—The local representatives of the American Red Cross under the Field Director continued their program of former years.

The Red Cross House is kept open daily from 10 a. m. to 8 p. m. throughout the year, and approximately 750 patients come to the House each day.

The Red Cross furnished moving-picture operators for 84 movies, and initiated and directed 280 parties and entertainments. They had 305 different activities on the wards; arranged 16 band concerts; distributed 3,200 tickets to theater and baseball parties; and transported the patients, through the kindness of the Motor Corps of the District of Columbia Chapter, to and from these activities. They arranged transportation for 150 ex-service patients who attended the White House Garden Party, and for 250 men and women patients who were guests on a cruise down the Potomac River. There were 18 baseball games played by the patients' team on the hospital diamond, attended by an average of 400 patients, and an average of 600 patients attended the baseball games played by the hospital employees.

During this fiscal year the Red Cross has had the services of a number of W. P. A. workers. The W. P. A. musical program has been extensive during the past year. The W. P. A. Orchestra played for both colored and white dances during the past year.

The assistance of the Red Cross is invaluable, and the intelligent and cordial cooperation of their personnel has added much to the

smooth running of the hospital and to the welfare and happiness of the patients.

ADMINISTRATIVE DEPARTMENT—OFFICE OF THE ASSISTANT TO THE SUPERINTENDENT

Supplies.—The supplies produced on the hospital reservation, farm, garden, and other products, included 293,357 gallons of milk, 146,519 pounds of fresh pork, 5,353 pounds of chickens, 14,719 dozens of eggs, 724 bunches of asparagus, 90 bushels of apples, 436 bushels of beans, 19,000 bunches of beets, and 485 bushels of cabbage.

In addition to the items mentioned, 26,369 gallons of ice cream were manufactured by the hospital.

The shoe shop produced 8,094 pairs of shoes and slippers for men, and 2,356 pairs of shoes and slippers for women and children. It repaired 2,100 pairs of shoes and slippers. It produced 3,116 men's belts, and 1,164 pairs of suspenders.

The mattress shop produced 2,747 mattresses and 2,413 pillows. The brush shop turned out 2,876 of various kinds of brushes. The broom shop made 6,175 common brooms and 100 whisk brooms. In the bakery there were baked 924,903 loaves of bread, 3,581,136 rolls, and 73,912 pounds of pastry. The laundry washed, dried, and ironed 14,188,433 pieces. The power plant manufactured 551,236,000 pounds of steam; the electrical department generated 3,848,640 kilowatt-hours of electricity; 463,521,000 gallons of water were pumped, and the main refrigeration plant produced 7,430 tons of ice and refrigeration. All the steam, electricity, ice, and refrigeration used on the reservation was manufactured by the hospital.

In addition, large quantities of clothing for men and women were made in the sewing rooms, tailor shops, and occupational therapy departments, and other items in various shops of the hospital.

Dairy and cow barn.—The Holstein-Friesian herd was again tested for tuberculosis and found to be free of the same, and after a further test to be free from Bang's Disease. This has been considered an accredited herd for over 30 years.

Hemorrhagic septicemia destroyed five cows in November and December. Vaccination checked it promptly. Calf pneumonia caused the greatest loss during December and January; 20 calves died of this disease in spite of treatment. The calf herd has been vaccinated with hemorrhagic septicemia bacterin with fairly good results; such vaccinations are being continued.

The milk supply fell below normal production during the months of September, October, and November, 1939, but during the months of December, January, and February the milk production rose to the

highest point in the history of the herd; a total of 29,531 gallons of milk were produced in March, with an average daily production of 952½ gallons. The average production for the fiscal years 1935 to 1939 was 281,140 gallons, and in 1940, 293,542 gallons were produced, an increase of 12,402 gallons over the past five-year average.

At the end of the fiscal year the hospital herd consisted of 94 calves, 78 heifers, 268 cows, and 11 bulls.

Piggery.—Conditions at the piggery have steadily improved. The herd at present consists of 1,048 animals. During the year 575 hogs were slaughtered, furnishing 146,519 pounds of fresh pork.

Poultry plant.—The poultry plant is gradually getting back to normal production of both meat and eggs. In 1938 the entire flock was killed off on account of the prevalence of parasites and disease among the fowls. The grounds and buildings were disinfected during the summer, and a new flock was started in the fall of 1938. These pullets began laying in February 1939 and since that time the production of meat and eggs has gradually increased.

During the year the greenhouse furnished 17,997 roses, 12,459 carnations, 4,696 calendula, 11,725 stevia, 462 chrysanthemum, 1,397 pompom chrysanthemum, 2,897 daffodils, 1,337 freesia, 1,107 hyacinths, 1,435 tulips, and 1,185 baskets of flowers. In addition, 2,276 bunches of assorted flowers were provided from the flower gardens.

Personnel.—The total number of employees on the hospital rolls June 30, 1940, was 1,867. There were 485 appointments during the year, and 404 separations.

During the year 20 employees were retired from the service on account of age and disability.

There was a 15 percent turnover in the permanent personnel, occurring chiefly in the force of attendants. This was an increase of 1½ percent over the previous year.

The problem of recruiting personnel for filling vacancies is becoming increasingly difficult, primarily due to the delays in securing eligibles from the Civil Service Commission.

There was an increase of 1,182 days of sick leave taken during the calendar year 1939 over the previous year. A total of 9,800 days of sick leave was taken by 986 employees. The average number of days for all employees increased ½ day per employee.

The Episcopal Chaplain, Rev. Roy E. LeMoine, resigned May 1, 1940, effective June 30.

Purchases.—Supplies were ordered in the amount of \$1,400,025. Of this amount, \$1,065,485 were open market purchases. There were 335 formal contracts entered into, amounting to \$334,539.

Financial office.—During the year disbursements approved through the financial office amounted to \$4,698,777. Collections received and deposited totaled \$3,242,498.

Fire department.—Regular inspections were made of the hospital by the fire marshal. The fire siren is tested monthly, and also the fire alarm system. The fire pumps at the powerhouse were tested weekly, and the triple combination pumper was tested daily and put in service once a week. Inspections are made weekly with officers and privates of the District of Columbia Fire Department, and occasionally with inspectors from the fire marshal's office. Fire drills are held weekly in various wards of the institution.

During the year there were 31 fire alarms, the property damage amounting to \$360. Approximate loss from fires from June 19, 1917, to June 30, 1940, \$6,234.05. The number of calls in this period was 305. The average loss was \$271.05 a year, and average number of calls 13.3 a year.

Continuous Treatment Building No. 4.—This building was completed, and a hydrotherapeutic department and a barber shop have been installed.

Continuous treatment buildings Nos. 5 and 6.—The work on continuous treatment buildings Nos. 5 and 6 is well under way and should be completed so as to be occupied about October 1, 1940. This will add facilities for approximately 400 beds.

The buildings were approximately 76 percent completed on June 30, 1940. On account of strikes several delays have occurred, for which an extension of about 126 days was approved.

Construction department.—Two rooms in the basement of the old Center Building were remodeled and converted into a barber shop for the use of the West Side Service. A new tile floor was laid and walls and ceiling replastered; a toilet room was installed, and guards placed in the windows.

Additional guards were placed on the sun porch of the Men's Receiving Building, being located on the fifth floor of that structure, to make it safer in preventing the patients from getting out of this porch.

B Building, Ward 4, was completely renovated. The plaster was almost entirely renewed, the floors and woodwork repaired, and the ward repainted.

The old operating room in B Building was made over into a ward with provision for 32 patients, and is known as Ward B-5, for women patients.

Electrical department.—The work of the electrical department has continued to grow. Not only is it required to provide hospital radio service for the patients in the various buildings, but many of the

patients have their own private sets installed under the supervision of the hospital.

Automatic telephone.—Five additional automatic telephones have been installed. The hospital automatic telephone system traffic amounted to 1,520,691 calls, the daily average being 4,152, and the hourly average 173. This represents an increase over the previous year of 3 percent.

During the year a new high-pressure steam line to the new hot water heater in the basement was installed at the laundry. An additional heater has been ordered in order to meet the increased demands of this department.

A new tractor, gas engine operated with scoop attached, was put in service at the power plant to move coal from the coal pockets to the coal conveyor and silos. This relieves the necessity of employing additional help for this purpose.

Guard force.—The guard force made several investigations of reports of stealing and were instrumental, with the assistance of the Metropolitan Police Force, in recovering stolen property consisting of 38 pigs, 4 hogs, and 13 bags of mill feed.

Laundry.—The work of the laundry continues to the same extent as previously reported. The number of pieces laundered, dried, and ironed during the year was 14,188,433.

Not only is the present laundry overcrowded but the limited methods of ventilating involve a hardship on the patients and employees who must work in this building. During the summer weather the temperature ranges from 116° to 120°. The serious overcrowding of equipment and the unpleasant working conditions call for immediate relief. The erection of a storeroom and warehouse building, the lower floor of which can be used for a laundry, is recommended.

Garage.—The work of the garage continued to increase. Not only is it necessary to use trucks for delivering material, but the additional buildings further removed from kitchens require food to be taken from the kitchens to the dining rooms. The growth of the population extending over the 400 acres of land required it to furnish transportation for 38,792 patients by bus and ambulance. Invalid coach stretcher cases were 587. This department must be in service 24 hours a day and 365 days a year.

Culinary department.—The dietetic force, like other departments, has been under pressure due to the increased number of patients.

Classes in dietetics for 20 student nurses were given, one lecture and 4 hours laboratory weekly. This instruction was given by one of the dietitians from February 6, 1940, for 15 consecutive weeks, 3 hours a week. A new class started June 4, 1940, and continued to the

end of the year; this class is for 16 student nurses, and consists of 15 hours of lecture, 2 a week of 1 hour each.

General, sick, and TB menus are made for 10-day periods, and a copy of these sent to each kitchen.

Visits are made regularly by the dietitians to the dining rooms in the respective services, supervising methods of serving the meals.

Creamery.—During the year the dairy pasturized 289,735 gallons of milk, a daily average of 793 gallons. About 1,000 quarts of milk were bottled daily; the remainder was canned for use in the kitchens and bakery and for making ice cream. A total of 61,000 gallons of pasteurized milk was purchased. The average consumption of milk during the year was 958 gallons per day. During the month of June, 1,510 gallons of skimmed milk was received from the Department of Agriculture farm at Beltsville, Md. This milk was used by the various kitchens for cooking purposes.

An average of 25 gallons of buttermilk was made daily by the cultured starter method.

The ice cream department manufactured a total of 27,043 gallons of ice cream, a daily average of 74 gallons.

NEW LEGISLATION

The President approved an act, under date of August 9, 1939, containing amendments in the laws setting up a Commission on Mental Health as an arm of the court to hear evidence and make recommendations to the court regarding the commitment of persons alleged to be suffering from mental disorder. These amendments have a tendency to improve the original act. There are several other amendments that should be made, such as provision for voluntary admission and family care.

Upon the recommendation of the Department of the Interior, legislation was introduced in Congress permitting the admission to St. Elizabeths Hospital of certain persons who are permanent residents of the Virgin Islands of the United States, who are citizens or nationals of the United States, and who have been legally adjudged to be insane in the Virgin Islands. This legislation has received favorable reports from the committees to which it was referred. If enacted, it will remedy an unfortunate situation with reference to the mentally ill of the Virgin Islands.

Similar legislation should be enacted looking toward the care and treatment of the white mentally ill in the Philippine Islands, since no provision has been made for citizens of the United States who may require mental treatment in those islands, and whose State residence cannot be determined.

NEEDS OF THE HOSPITAL

The hospital continues to grow. The admissions are increasing, and there is still a shortage of beds. One thousand beds should be provided to cover immediate needs and to include the replacement of the semipermanent group of buildings which were erected in 1918, with an estimated life of from 15 to 20 years. This semipermanent group of 530 beds is in a dilapidated condition and far from fire-proof. The cost of repair is increasing, and the hazard from fire is considerable.

The increase of 306 in the population during 1939 and 261 in 1940 more than offsets additional beds previously authorized. At the present time the hospital has practically no available beds and it has been necessary to put additional beds on various wards to take care of the new patients as received.

Two continuous-treatment buildings are to be located adjacent to the continuous-treatment kitchen where provision has been made for the preparation and service of food; dining rooms will have to be provided and a tunnel connection to the kitchen so that the food may be brought to the building. It is planned to have cafeteria service in the dining rooms attached to these buildings. The same condition applies to the three buildings that are suggested to replace the semipermanent group. Ground room is available for these buildings.

The present storeroom was built more than 30 years ago. Since that time the population has very nearly tripled, but no change has been made in the storeroom and warehouse. The present storeroom, with cold-storage equipment, is practically out of date and the storage facilities are insufficient to care for adequate quantities of current supplies. In order properly to house supplies that must be cared for and regularly issued to the various buildings and industries, all sorts of out-of-the-way places have been utilized. The basements of many buildings housing patients have been used for storing furniture. The District Fire Department properly objects to this procedure. It is difficult to give proper protection to articles in all classes of buildings, and there is possibility of shrinkage.

An estimate of \$950,000 is recommended to purchase farm land, to construct buildings to house patients who would work on the farm, to construct buildings to house employees, for the farm animals, including dairy, piggery, poultry plant, a building for pasteurizing milk, making ice cream, and other necessary farm buildings, including expenditures for the purchase of land, preparation of plans and specifications, advertising, and supervision of construction.

The hospital consists of four plots of land, in all about 800 acres. The last land purchased for hospital use was in 1891. At that time

the hospital had about 1,500 patients, and over 600 acres were used for farm and garden purposes. The hospital, while originally isolated some miles from the center of the city, at the present time on account of the growth of the city and the use of various forms of transportation, is now adjacent to the city and is surrounded by a growing population. The dairy and piggery are in proximity to buildings occupied by patients, and the dairy barn is adjacent to Nichols Avenue, a thoroughfare running through this section of the city, both the dairy and piggery being the subject of a good deal of justified complaint on the part of the inhabitants of this section.

It is believed desirable to obtain approximately 5,000 acres of land, to concentrate all farm projects in one place, increase the size of the dairy herd, the piggery, and the poultry farm, and build about 6 cottages, housing 40 patients each, on this site. This arrangement would permit an increased number of patients to derive the therapeutic benefits of healthful outdoor occupation. This would also prove an economic arrangement, in that the hospital would be able to secure sufficient milk for all purposes, to increase the quantity of pork products, and probably to cure pork products, thus reducing the quantity of ham, bacon, and shoulder to be purchased, and also increase the quantity of poultry products, such as fowl and eggs. Furthermore, the removal of the farming activities from the Nichols Avenue site would make available a considerable area of valuable land which could be used for further buildings and for other activities closely related to the immediate problem of the care of patients. Preliminary studies indicate that such a site could be secured within from 10 to 20 miles from the main plant.

PUBLICATIONS

Overholser, Winfred, Superintendent:

Psychiatric Expert Testimony. Mental Health. Publication No. 9 of the American Association for the Advancement of Science. Lancaster, Pa., the Science Press, 1939, p. 313-318.

Psychiatry and the Law—Cooperators or Antagonists? *Psychiatric Quarterly* 13: 622-638, October 1939.

The Broadening Horizons of Medicine. *Science* 90: 359-363, October 20, 1939.

Famous Madcaps of History. Abstract of Lecture sponsored by Chicago Medical Society, Chicago, Ill., November 1, 1939. *Chicago Medical Society Bulletin*, 42: 314-318, November 25, 1939.

Some Possible Contributions of Psychiatry to a More Effective Administration of the Criminal Law. (Presented by invitation before the Montreal Psychiatric Society, April 27, 1939.) *The Canadian Bar Review*, 17: 638-655, November 1939.

The Desiderata of Central Administrative Control of State Mental Hospitals. (Read at the ninety-fifth annual meeting of the American Psychiatric Association, Chicago, Ill., May 8-12, 1939.) *American Journal of Psychiatry* 96: 517-534, November 1939.

Reformation of Criminals. (Book review: Problems in Prison Psychiatry, by J. G. Wilson and M. J. Pescor.) Scientific Monthly 50: 80-81, January 1940.

Problems in Prison Psychiatry, by J. G. Wilson and M. J. Pescor. (Book review.) Mental Hygiene 24: 141-143, January 1940.

Famous Madcaps of History. Illinois Medical Journal 77: 253-262, March 1940.

Some Pioneer Psychologists. (Book review: Mind Explorers, by John K. Winkler and Walter Bromberg.) Scientific Monthly 50: 272, March 1940.

The Life of the Mind. (Book review: Facts and Theories of Psychoanalysis, by Ives Hendrick.) Scientific Monthly 50: 370-371, April 1940.

Crime and Society, by Edward A. Strecker. (Book review.) Mental Hygiene 24: 304-305, April 1940.

Beyond the Clinical Frontiers, by Edward A. Strecker. (Book review.) Journal of the American Medical Association 114: 2052, May 18, 1940.

Intelligence and Crime, by Simon H. Tulchin. (Book review.) American Journal of Psychiatry 96: 1476-1477, May 1940.

Are Mental Disorders Increasing? (Book review: New Facts on Mental Disorders, by Neil A. Dayton.) Scientific Monthly 50: 559-561, June 1940.

Saint Elizabeths Hospital: Past, Present and Future. In Papers Presented Before Third Annual Meeting of the Medical Society of St. Elizabeths Hospital, April 20, 1940. Washington, D. C., United States Department of the Interior, 1940.

Eldridge, Watson W., Principal Medical Officer:

The Incidence of Hyperostosis Frontalis Interna in Female Patients Admitted to a Mental Hospital. (With G. A. Holm.) American Journal of Roentgenology and Radium Therapy 43: 356-359, March 1940.

Katzenelbogen, Solomon, Director of Laboratories:

Electro-encephalographic Studies. (With Robert Cohn.) United States Naval Medical Bulletin 37: 596-599, October 1939.

A Critical Appraisal of the "shock therapies" in the major psychoses, I: Insulin. Psychiatry 2: 493-505, November 1939.

An Attempt to Condition Gastric Secretion to Histamin. American Journal of Physiology 128: 10-12, December 1939.

Functional Diseases of the Gastro-intestinal Tract: a Viewpoint of the Psychiatrist. Diseases of the Nervous system 1: 1-4, January 1940.

Pharmacologic Shock Therapy. New International Clinics 1: 105-114, March 1940.

A Critical Appraisal of the "shock therapies" in the Major Psychoses, II: Insulin. Psychiatry 3: 211-228, May 1940.

Karpman, Benjamin, Senior Medical Officer:

The Delinquent as a Type and Personality. Journal of Criminal Psychopathology 1: 24-33, July 1939.

The Mental Roots of Crime: a Critique. (Critical Review of The Roots of Crime by Alexander and Healy.) Journal of Nervous and Mental Disease 90: 89-142, July 1939.

Thalassa: a Theory of Genitality, by Sandor Ferenczi. (Book review.) American Journal of Psychiatry 96: 747-755, November 1939.

Principles and Aims of Criminal Psychopathology. Journal of Criminal Psychopathology 1: 187-218, January 1940.

- Holm, George A., Internist: The Incidence of Hyperostosis Frontalis Interna in Female Patients Admitted to a Mental Hospital. (With W. W. Eldridge.) *American Journal of Roentgenology and Radium Therapy* 43: 356-359, March 1940.
- Fong, Theodore C. C., Senior Medical Officer: Therapeutic Quartan Malaria in the Therapy of Neurosyphilis Among Negroes. *American Journal of Syphilis, Gonorrhea* 24: 133-147, March 1940.
- Duval, Addison M., Senior Medical Officer: Juvenile General Paralysis. (With Jay L. Hoffman.) *Journal of Nervous and Mental Disease* 90: 19-21, July 1939.
- Simon, Alexander, Senior Medical Officer:
 Syphilitic Polyneuritis, a Clinicopathologic Entity. (With Sidney Berman.) *Archives of Neurology and Psychiatry* 42: 273-285, August 1939.
 Treatment of Dementia Praecox by Pharmacological Shock. (With E. H. Parsons and Z. Lebensohn.) *Military Surgeon* 85: 508-514, December 1939.
- Hoffman, Jay L., Medical Officer: Juvenile General Paralysis. (With A. M. Duval.) *Journal of Nervous and Mental Disease* 90: 19-21, July 1939.
- Richmond, Winifred V., Psychologist: Psychological Studies in Dementia Praecox. (With I. Kendig.) Ann Arbor, Edwards Brothers, 1940. 211 p.
- Kendig, Isabelle, Psychologist: Psychological Studies in Dementia Praecox. (With W. V. Richmond.) Ann Arbor, Edwards Brothers, 1940. 211 p.
- Cohn, Robert, Assistant Scientist: Electro-encephalographic Studies. (With S. Katzenelbogen.) *U. S. Naval Medical Bulletin* 37: 596-599, October 1939.
- Haydon, Edith M., Superintendent of Nurses: Textbook of Psychiatry. (With Arthur P. Noyes.) 3d edition. New York, Macmillan, 1940. 315 p.
- Earle, Elizabeth C., Assistant Chief Nurse: Anatomy and Physiology. (With Frederick T. Jung and A. R. Benjamin.) Philadelphia, Davis, 1939. 637 p.

COLUMBIA INSTITUTION FOR THE DEAF

Percival Hall, President

DURING the fiscal year which ended June 30, 1940, there were under instruction in the advanced department of the institution, known as Gallaudet College, 96 men and 65 women, a total of 161, representing 40 States and the District of Columbia. This was an increase of 10 as compared with the preceding year.

In the primary and grammar department, known as the Kendall School, there were under instruction 28 boys and 45 girls, a total of 73. This was a decrease of 4 as compared with the preceding year. Of the total in this department, 69 were admitted as beneficiaries of the District of Columbia.

There were admitted to the institution 31 males and 27 females; discharged, 29 males and 20 females.

COURSES OF INSTRUCTION

A revision was carried out in the course of instruction in the advanced department, calling for more teaching of principles of education and psychology and fewer hours of Latin. Additional courses were offered in orientation, hygiene, and appreciation of art.

THE NORMAL DEPARTMENT

Since 1891 a normal department has been maintained in connection with the institution. The fellows in this department are appointed for one year's instruction. They are hearing graduates of colleges of good standing. Six young people—two young women and four young men—were trained during the past year, and all received appointments to teach in various schools for the deaf. The services of this group of young people have been eagerly sought for by the authorities of schools for the deaf. A recent check of the activities of the graduates of this department shows 28 at the head of various schools in this country and abroad, and 27 as principals of school departments.

HEALTH

Good health prevailed during a large part of the school year. During the winter, however, there were many mild cases of influenza. There were three cases of appendicitis requiring operation. In all three cases the operation was successful. There were no deaths among the students during the year.

Our institution physician has for many years worked on the prevention of disease among our pupils and students, and by careful physical examination and inoculation, our school population has escaped serious contagious diseases for many years.

The dining rooms were furnished with a plentiful supply of high-grade milk from our own farm during the year, and wholesome food was provided for all. Weight charts of all students and pupils were kept and examined at intervals to determine if special diets were required in particular cases.

NEEDS OF THE INSTITUTION

The dormitory space in the buildings assigned to the children of the Kendall School and the students of the college is now all taken up. There is urgent need for a library and recitation building, which has been requested for several years and approved by the Secretary of the Interior but not yet granted by Congress.

By the provision of this building, rooms would be vacated in the men's dormitory that would allow an increase of 15 to 20 men students.

SEVENTY-FIFTH ANNIVERSARY

The final chapter in the celebration of the seventy-fifth anniversary of the advanced department of the institution was the holding of a regular meeting of the Conference of Executives of American School for the Deaf in our institution during the month of October 1939. Between 40 and 50 heads of schools in the United States and Canada attended the meeting, and distinguished guests from Johns Hopkins University and the George Washington University, as well as members of our own faculty, took part in the program. The president of this institution was elected president of the conference, and the vice-president, secretary, treasurer, and chairman of the executive committee are all graduates of our normal department.

PRESENTATION DAY

The seventy-sixth commencement of the collegiate department was held on Saturday, June 1, 1940. Six students received the degree of

master of arts in the normal department; 14, the degree of bachelor of arts, and 12, the degree of bachelor of science.

RECEIPTS AND EXPENDITURES

The total receipts, including balance on hand July 1, 1939, were \$199,631.70. Expenses were \$196,331.04. A reserve of \$507.32 was returned to the treasury, leaving a balance of \$2,793.34.

FREEDMEN'S HOSPITAL

Dr. T. Edward Jones, Director in Chief

A MOMENTOUS event occurred in the history of Freedmen's Hospital during the fiscal year just closed.

By virtue of the authority contained in section II (e) of Reorganization Plan IV made effective June 30, 1940, by Public Resolution No. 75, Seventy-Sixth Congress, approved June 4, 1940, the following order was promulgated by the Administrator of the Federal Security Agency for the guidance of all concerned:

1. Freedmen's Hospital and its functions shall be administered under the direction and supervision of the Federal Security Administrator through the Surgeon General of the Public Health Service. Subject to the provisions of Agency Orders No. 5 and No. 6, the service facilities of the Public Health Service shall be made available to and utilized by Freedmen's Hospital. The Cooperative Agreement for the Management and Operation of Freedmen's Hospital, executed October 27, 1939, by the Secretary of the Interior, the President, and the Acting Secretary of the Howard University shall remain in full force and effect.

The reorganization plan thus transferred Freedmen's Hospital from the United States Department of the Interior which had exercised supervision for more than 70 years. The growth and expansion of Freedmen's Hospital during that period of time can be depicted as follows:

Its establishment as a Bureau for the relief of freed men and refugees dates back to an act of Congress dated March 3, 1865.

During the years 1868-69 the Freedmen's Hospital permanent quarters were built; a brick building 54 by 100 feet and three frame wards 24 by 120 feet were constructed. The ground surrounding them covered a space of nearly 4 acres. The third and fourth stories of the brick building were occupied by the medical department of Howard University, and the rest of the building along with the frame wards were used for hospital purposes.

The hospital is now comprised of nine buildings situated within a square bounded by two city blocks on either side. Provision is made for both indigent and pay patients without regard to legal residence.

PROFESSIONAL ADVANCEMENT

The visiting (attending) staff has grown from approximately 10 in 1869 to 85 during the fiscal year ending June 30, 1940. There is also

a professional staff of 17 internes, 8 assistant residents, and 4 residents. The members of this staff are the immediate aides to the visiting staff.

TRAINING SCHOOL FOR NURSES

Freedmen's Hospital Nurse Training School, established in 1894, gives young women theoretical and practical instruction in trained nursing. Upon graduation they are eligible for membership in graduate nurse associations, and for State boards examination. The Training School for Nurses graduates annually approximately 12 percent of all colored nurses graduating from schools within the United States. The present director of nurses of Freedmen's Hospital is a product of its school.

HOWARD UNIVERSITY RELATIONSHIP

Freedmen's Hospital is the training center for the students of Howard University School of Medicine. This school graduates annually upward of 40 percent of all Negro medical graduates in the United States. Both institutions are rated class A by the American College of Surgeons.

The close affiliation of Howard University School of Medicine with Freedmen's Hospital, which has existed since the founding of the school in 1867, was further strengthened by the Cooperative Agreement for the Management and Operation of Freedmen's Hospital executed October 27, 1939, by the Secretary of the Interior and the President, and the acting secretary of the Howard University. This agreement definitely outlines the functions of each, and enhances the value of these two institutions as an efficient training center for the medical profession.

ACTIVITIES AND ACHIEVEMENTS FOR THE FISCAL YEAR 1939-40

One of the most outstanding achievements is the addition of a tuberculosis unit building of 150-bed capacity. This unit is the result of an allotment of \$700,000 by the Public Works Administration, for its construction and equipment. Its available occupancy January 1, 1941, will do much toward the establishment of an adequate number of beds for tuberculous patients.

Lowered Mortality Rate

	Number indoor patients treated	Mortality rate
Fiscal years:		
1939	6, 710	0. 055
1940	6, 980	. 045
Reduction .....		. 010

ACCOUNTING SYSTEM

Approving a request from the director in chief of Freedmen's Hospital, the Secretary of the Interior invited the General Accounting Office to make a comprehensive survey of the accounting needs and requirements of Freedmen's Hospital. The purpose of this survey was to develop and install a standardized accounting system and procedures for the purpose of furnishing accurate and essential data to the Congress, the Bureau of the Budget, the Department of the Interior, and the administrative officers of Freedmen's Hospital.

As a result of the survey, a standardized system of general ledger and allotment ledger control accounts was installed. The sum of the benefits derived from the installation of this system are as follows:

1. Increased collections of moneys due the hospital from pay patients.
2. Coordination between the various pay units of the hospital and the collection department.
3. Establishment of uniform standards to be used in determining patients' ability to pay for services.
4. Administrative approval for the reduction or cancellation of erroneous pay patients' accounts.
5. Uniform and consistent issuance of formal receipts.
6. Prompt recording and depositing of payment by patients.
7. Periodic billings to all hospital debtors.
8. Development of new income by claims for service rendered in incident and compensation cases against insurance companies.
9. Improved control over stores and equipment.
10. Improved and uniform purchasing procedures.
11. Establishment of accurate accountability for retirement funds.

The procedures encompassed within the system installed have resulted in a substantial reduction of hospital expenditures.

Subsequent to the original request and at the informal suggestion of the Bureau of the Budget, in order to facilitate the preparation of statements of expenditure required by the Bureau of the Budget, the Department of the Interior, and Freedmen's hospital, it was decided to develop a standard cost distribution system for Government hospitals and utilize the experience gained at Freedmen's Hospital for this purpose. This was accomplished through the departmentalization of the various units of the hospital together with a classification by objects of expenditure by departments. This standard system of cost distribution provides accurate data for the preparation of operating statements and administrative reports, a careful study of which by the administrative officials tends toward a more economical and efficient operation of the hospital, as well as providing the Bureau of the Budget with adequate information for comparison with operating costs of other Government hospitals looking to the ultimate development of true and factual standards of efficient administration and professional service.

FILING SYSTEM

A comprehensive filing system has been completed by a corps of District of Columbia W. P. A. workers.

Work on the project started July 5, 1938. As many as 43 qualified typists, clerical workers, and other white-collar workers were engaged at peak employment.

In setting up the case record files, the W. P. A. workers transcribed several thousand such records to assure their future existence. Index cards briefly recording other case histories, dating from 1881, also were made a part of the records.

Other accomplishments include the arrangement, classification, codification, and filing of 10,000 emergency patients' cards, as well as the rearrangement in chronological sequence of the hospital census sheets dated July 1907 to the present.

On September 8, 1938, a unit history system for in-patients was installed, thus bringing together in one folder all hospital admissions regardless of the number of times a patient is admitted.

A similar system was installed at the same time for the out-patient records, however, existing personnel and space have not been adequate to combine the two systems so that there would be actually one unit system which includes both in-patient and out-patient records.

A lack of sufficient personnel is at this time a distinct handicap to the efficiency and completeness of this system.

GROWTH EXCEEDS PHYSICAL CAPACITY AND PERSONNEL

The continued rapid growth of activities has overtaxed the physical capacity of the hospital as well as its personnel and equipment. The attendance upon our out-clinics was:

Fiscal year:

1938-----	55, 304
1939-----	73, 196
1940-----	82, 751

OBSTETRICAL DEPARTMENT

Fiscal year:

1938-----	951
1939-----	1, 050
1940-----	1, 271

IN-DOOR PATIENTS

Fiscal year:

1938-----	6, 225
1939-----	6, 710
1940-----	6, 980

HOWARD UNIVERSITY

Mordecai W. Johnson, *President*

GENERAL TREND OF THE UNIVERSITY

THE year 1939-40 was the seventy-seventh year of the emancipation of the slaves, the seventy-third year of the operation of Howard University, the sixty-first year of the Government support of Howard University, the eleventh year since the passage by Congress of the basic law authorizing annual appropriations in support, construction, and maintenance of the university, and the ninth year of the Government's ten-year program to establish Howard University on a sound basis of functioning as a first-class university service.

Student body and resources.—In the year 1939-40 Howard University had a student body of 2,338 students from 40 States and 14 foreign countries, and a faculty of 259 teachers (equivalent to 183 on full-time). Degrees were awarded to 259 graduates in 10 schools and colleges, including the graduate school, the college of liberal arts, the school of engineering and architecture, the school of music, the college of medicine, the college of dentistry, the college of pharmacy, the school of law, the school of religion, and the summer school. The institution had a physical plant valued at \$7,560,411, total assets of \$9,769,829, and an income for current purposes of \$1,164,214. It was receiving the support of the Congress of the United States, the Public Works Administration, the Works Projects Administration, the National Youth Administration, the General Education Board, the Julius Rosenwald Fund, and other private foundations and individuals.

Status and progress under 10-year plan.—During the period since the passage of the substantive law in 1928, including 9 years of the 10-year program, the capital assets of the university have been more than trebled, its book collection more than doubled, and its movable and flexible scientific and educational equipment modernized and trebled. The total number of teachers increased by 60 percent and the total number of full-time teachers increased by 98.7 percent, so as to place 88 percent of instruction in their charge. The university as a whole has moved 72 percent of the way toward a first-class faculty and administrative staff, 67.5 percent of the way toward first-class ade-

quacy in flexible and educational scientific equipment and supplies, and more than 50 percent of the way toward a first-class educational plant.

Physical-plant improvements.—During the year one main building was under construction. The new men's dormitory, made possible by an appropriation of \$646,200 from the Federal Public Works Administration, was finished, dedicated as the George W. Cook Hall, and turned over to the university by the Secretary of the Interior.

There were three projects financed by the Works Projects Administration during the year 1939-40—one painting and two landscaping projects. Under the painting project 17 buildings received interior painting and 5 buildings received exterior painting, totaling approximately 1,100,000 square feet of work. Fencing and lamp standards were painted also.

Under the first landscaping project, the parking area at the medical school was enlarged, about 6,600 square yards of grading and 1,100 square yards of seeding were completed, a flight of concrete steps was constructed, approximately 2,300 trees were planted and about 6,000 plants were cultivated. Under a second project which was in progress at the close of the fiscal year, approximately 40,000 square yards of lawn had been renovated and about 1,600 trees and shrubs had been planted. The value of all landscape work done under these projects during the year was approximately \$19,000.

Increased number and caliber of students.—The enrollment of 2,338 students in 1939-40 represents a total gain of 712 students since the low point of the depression in 1933-34. The university was being fed at its base (the college) by 140 high schools and at its summit (the graduate school) by 67 colleges and universities. In the professional schools of medicine, dentistry, law and religion, 77 percent of the students were holders of college degrees as compared with 70 percent for the preceding year and 665 or 28 percent of all students in the university were persons holding one or more advanced degrees.

Graduates of the college of medicine continued to maintain a high record before State examining boards. Thirty-three were examined by 12 medical State boards in 1939. Of these, 31 passed and 2 failed.

Four additional divisions of the university accredited.—In October 1939 Howard University was placed on the list of accepted institutions by the Association of American Universities, the highest of the rating agencies for universities and colleges. In May 1940 the division of social work of the graduate school was admitted to membership as a type I member school in the American Association of Schools of Social Work. In December 1939 the American Association of Theo-

logical Schools placed the school of religion on its list of accredited theological schools. In January 1940 the college of pharmacy was accredited by the American Council on Pharmaceutical Education.

Successful civilian pilot training program.—Howard University participated in the civilian pilot training program of the United States Civil Aeronautics Authority. This program offered an opportunity for young Negro college students to obtain flight training under the leadership of the school of engineering and architecture. Ten Howard students were admitted to the course. Of these nine successfully completed the course and received private pilot certificates. Three were recommended for the advanced pilot training program.

Division of social sciences sponsors public lectures.—On May 15-16, 1940, the division of social sciences of the graduate school sponsored a series of public lectures which covered aspects of the life of Negro peoples in the independent American nations, Canada and the British West Indies. These lectures were presented for the purpose of adding to the knowledge of the subject and stimulating consideration of the future prospects of race relations in the Western Hemisphere.

Progress of the special Negro library collection.—From the standpoint of library resources, the one unique collection which Howard University has been developing is that composed of material by and about Negroes. This collection, known as the Moorland Foundation, has grown from a total of 5,449 books and periodicals in 1934-35 to 11,796 books and periodicals and Howard masters' theses. In addition, the nature of the material acquired becomes increasingly more varied. Manuscript letters, musical compositions (both printed and manuscript), broadsides, programs, photographs, pictures, maps, photostats, microfilms, college catalogs, etc., are included in the acquisitions of the collection.

Postgraduate courses established in dentistry.—The university took a forward step in approving a plan for the college of dentistry to inaugurate a postgraduate course beginning in the summer of 1940. The provision of postgraduate instruction is one of the most fundamental needs of the Negro practitioner of dentistry today.

College of liberal arts takes important steps to improve quality of instruction.—The college of liberal arts inaugurated several important changes designed to improve the quality of instruction and the caliber of the students. A new advisory system was set into operation for the first time in the college. Every student is now under an advisor during his entire time in the college.

Admission requirements have been raised. Instead of admitting unconditionally every student who has 15 acceptable units from an

accredited high school, only those students graduating in the upper half of their class are admitted unconditionally. Students graduating in the lower half of their class are admitted on trial and must maintain an average of C during their first year in the university, based on at least 20 semester hours of work.

Graduation requirements have also been raised in one important respect. Whereas formerly a student could present toward graduation not more than 20 semester hours of D grade, now a student ceases to be a candidate for graduation when he has accumulated more than one-fifth of the credits required for graduation (normally 24 semester hours), with grade of D, E, F, and WF. While the new rule may allow a slightly larger number of D's than formerly it is much more stringent because it includes failing grades as well as D's.

The school of religion makes significant advances.—The school of religion acquired during the year one of the finest library collections of its size in the United States. The collection included 39,000 volumes. It was purchased from the Auburn Theological Seminary for \$10,000, made possible by the trustees of the Pillsbury Fund who made a gift of \$6,000 and granted the university an additional loan of \$4,000 to make up the full purchase price. The school of religion library now totals approximately 47,000 volumes.

During the year the school of religion moved into its new home, formerly the Carnegie Library Building. With a new home, library and accreditation by the American Association of Theological Schools, the school of religion now takes its place as one of the strongest divisions of the university.

School of law gives decisive help in important civil rights cases.—The members of the faculty of the school of law continued to be active in the rendering of uncompensated legal services in matters of general public concern. Faculty members of the school of law were leading advocates in litigation challenging racial salary discriminations in the compensation of public school teachers and in legal efforts to obtain for Negroes equality of opportunity for graduate and professional training.

Medical school continues to go forward.—The most significant event relating to the medical school during the year was the signing of an agreement between the board of trustees of Howard University and the Secretary of the Interior which provides for a more satisfactory relationship between the college of medicine and the Freedmen's Hospital. This agreement places the responsibility for the professional services of the hospital on the college of medicine of Howard University. This responsibility will enable the college of medicine to carry out a pro-

gram of medical education in the hospital as a first class university teaching hospital.

This agreement becomes even more significant with the near completion of the 150-bed tuberculosis annex at Freedman's Hospital, made possible by a grant of \$600,000 from the Public Works Administration. The value of facilities for clinical training in tuberculosis which will be available to our medical students cannot be overestimated.

With the appointment of a member of the full-time staff as professor and head of the department of obstetrics and gynecology, all the departments of instruction in the college of medicine were provided with full-time leadership for the first time. This step constitutes a decisive improvement in the clinical branches of medicine.

Outstanding needs of the university.—The outstanding needs of the university, made increasingly clear during the year, were: (1) Immediate increases in the number of teachers in the graduate school, in the clinical branches of medicine and in the school of engineering and architecture; (2) an increase of 30 in the number of mature teachers of professorial rank; (3) an increase of \$7,000 annually to make important supplements to the gravely deficient book collection in our library; (4) the doubling of funds for scholarships and student aid, especially for teachers in the South, who receive low salaries and may not otherwise find it possible to pursue the graduate work which they need to increase their efficiency; (5) increased funds for at least that minimum of research which is necessary to maintain a living mind in the members of the teaching staff; and (6) the following buildings: (a) A well-equipped building to house the school of engineering and architecture; (b) a modern building and equipment for the work in dentistry; (c) an administration building for the centralization and proper inter-relation of the administrative services of the university; and (d) an auditorium building which would contain provisions for the school of music, the department of art, and the work of dramatics, and (e) an armory to accommodate the Reserve Officers' Training Corps.

STUDENTS

University enrollment.—The total enrollment for the year 1939-40 was 2,338, of whom 1,130 were men and 1,208 were women. Comparison with the previous year is shown in the following:

Summary of Students Enrolled in Howard University for the Years 1939-40 and 1938-39

Division of the university	Net enrollments						Total gain	Total loss
	1939-40			1938-39				
	Total	Men	Women	Total	Men	Women		
THE COLLEGES								
College of liberal arts.....	1,351	587	764	1,383	583	800	-----	32
School of engineering and architecture.....	62	62	-----	59	59	-----	3	-----
School of music.....	83	24	59	92	33	59	-----	9
Graduate school.....	398	136	262	407	164	243	-----	9
Total.....	1,894	809	1,085	1,941	839	1,102	-----	47
PROFESSIONAL SCHOOLS								
School of religion.....	34	32	2	25	25	-----	9	-----
School of law.....	58	56	2	70	69	1	-----	12
School of medicine:								
College of medicine.....	132	118	14	154	142	12	-----	22
College of dentistry.....	69	59	10	51	45	6	18	-----
College of pharmacy.....	38	36	2	31	29	2	7	-----
Total.....	331	301	30	331	310	21	-----	-----
Total in regular courses.....	2,225	1,110	1,115	2,272	1,149	1,123	-----	47
Special students in music, religion, law, dentistry, medicine.....	131	32	99	132	32	100	-----	1
Total.....	2,356	1,142	1,214	2,404	1,181	1,223	-----	48
Less duplications.....	18	12	6	11	8	3	7	-----
Grand total (net).....	2,338	1,130	1,208	2,393	1,173	1,220	-----	55

Geographical distribution.—Of the regular students enrolled for the school year, 1939-40, 95.7 percent came from the continental United States, and 4.3 percent from without the borders of the United States, as compared with 95.9 percent and 4.1 percent, respectively for 1938-39.

Forty states sent 2,082 candidates for degrees in 1939-40 as compared with 40 States sending 2,179 candidates for degrees in 1938-39. The regional distribution of candidates for degrees is as follows: From the North, 509 students distributed as follows: New England, 56; the Middle Atlantic States, 309; the East North Central States, 93; the West North Central States, 51. From the South, 1,562 students distributed as follows: The South Atlantic States, 1,292; the East South Central States, 169; the West South Central States, 101. From the West, 11 students distributed as follows: Mountain States, 4; Pacific States, 7.

Fourteen foreign countries sent 94 candidates for degrees during the school year 1939-40 as compared with 17 foreign countries with a total of 93 candidates for degrees in 1938-39.

Students of graduate caliber.—Two of the professional divisions of the university, pharmacy, and the department of dental hygiene in the college of dentistry, receive students on the basis of regular college entrance requirements. The division of medicine, dentistry, law, and religion require definite amounts of college work. Of the 87 students entering the regular freshman classes of medicine, den-

tistry, law, and religion in 1939-40, 75 or 86 percent entered with college degrees. Two hundred forty-two, or 77 percent, of the 313 students in these 4 professional schools are degree-holding students. Of the 2,338 students in the entire university, 665 or 28 percent, are persons holding one or more advanced degrees as compared with 661, or 27 percent of the 2,393 students in 1938-39.

Scholarships and student aid.—Scholarships within the university continued to be administered on the basis of an allotment of 7½ percent of all students fees as provided by the trustees of the university.

During the academic year 1939-40 the committee on scholarship and student aid received about 1,200 applications for aid. Five hundred and three students, or 21 percent of the student body were awarded scholarships and fellowships of various kinds. Two hundred and seventeen of those aided received work scholarships from the National Youth Administration, totaling \$23,316.45 or an average of \$107.44 per student. The total amount available for scholarships from all sources was \$55,646.77.

One of the most urgent needs of Howard University is a substantial increase in the amount of scholarship funds for the aid of the many needy, worthy students who, without such aid, will be unable to secure the educational advantages which they seek and deserve.

GRADUATES

Number and distribution.—In 1939-40 Howard University had 259 graduates coming from 31 States, the District of Columbia and 3 foreign countries. The following table gives the number of graduates from each division of the university.

Summary of Students Graduated by Howard University for the Years 1939-40 and 1938-39

Divisions of the university	Graduates					
	1939-40			1938-39		
	Men	Women	Total	Men	Women	Total
THE COLLEGES						
College of liberal arts.....	63	70	133	59	92	151
School of engineering and architecture.....	6	—	6	3	—	3
School of music.....	2	5	7	3	1	4
Graduate school.....	15	26	41	20	22	42
Total.....	86	101	187	85	115	200
PROFESSIONAL SCHOOLS						
School of religion.....	4	—	4	5	—	5
School of law.....	17	—	17	22	—	22
School of medicine:						
College of medicine.....	30	2	32	28	2	30
College of dentistry:						
4-year course.....	7	—	7	7	—	7
Dental hygiene.....	—	7	7	—	6	6
College of pharmacy.....	5	—	5	—	1	1
Total.....	63	9	72	62	9	71
Grand total.....	149	110	259	147	124	271

Honorary degrees.—Three honorary degrees were conferred at commencement on June 7, 1940. The degree of doctor of laws was conferred upon John W. Davis, president of West Virginia State College; Myles Anderson Paige, judge of Special Sessions Court, New York City; and Asa Philip Randolph, president of the Brotherhood of Sleeping Car Porters.

Total number of Howard University graduates.—The total number of graduates of Howard University is now 10,796. Of this number the registrar has approximately 6,000 correct addresses in 43 States, the District of Columbia and 15 foreign countries, classified alphabetically by States, cities, sex, schools, and classes.

THE TEACHING STAFF

Number and full-time status of teachers.—There were 259 members of the teaching staff for 1939–40, of whom 161 were full-time teachers and 98 were rendering part-time service, representing together a full-time equivalent of 183.62 teachers.

In 1928 when the trustees began to put the 10-year program into operation, there were 161 teachers in the university, 81 of them being on full-time service and 80 on part-time service. During the intervening period the total number of teachers has been increased by 98 or 60 percent and the total number of full-time teachers has been increased by 80 or 98.7 percent. The full-time teaching staff has now been practically doubled.

This means, in brief, a major improvement that has greatly strengthened the quality of instruction in all divisions of the university, and has substantially transformed the accredited standing of the several schools and colleges. The teaching load in the college of liberal arts, for example, has been reduced by one-half. Eighty-eight percent of the work of instruction in the university is now being done by teachers who are devoting their full time to education.

In relation to this objective of an adequate number of teachers, three divisions of the university require immediate help. These are: (1) The graduate school, where the work of instruction at present falls almost entirely upon the teachers of the college of liberal arts; (2) the clinical branches of medicine; and (3) the school of engineering and architecture, where there has been no full-time additions to the staff during the past ten years although the enrollment has more than doubled in that period.

The maturity of the staff.—On the basis of the 10-year program the present staff of Howard University should have the following distribution: Professors (40 percent) 66, associate professors (10 per-

cent) 16, assistant professors (20 percent) 33, instructors (30 percent) 49.

In 1939-40 the actual staff on full-time and full-time equivalent basis was: Professors (20 percent) 37, associate professors (12 percent) 22, assistant professors (24 percent) 44, instructors and assistants (44 percent) 81. This means that 68 percent of the staff are in the lower two ranks, as compared with the 10-year objective of 50 percent, and only 20 percent are in the professorial rank, as compared with the 10-year objective of 40 percent. The university is still only slightly beyond the halfway mark in the number of mature professors. Thirty such men and women are now needed.

Salaries of teachers.—In spite of the depression and the small increases in income for current purposes, the trustees of the university have persistently endeavored to improve the salary status of the members of the teaching staff. A minimum, average, and maximum salary scale for each rank of instruction was included in the 10-year program. The minimum salary scale has been achieved and surpassed for each rank but the university is still short of the average objectives by the following amounts: Instructors, \$177; assistant professors, \$216; associate professors, \$196; professors, \$829.

Tenure regulations and retirement system.—Regulations governing tenure have been adopted and revised by the trustees after consultation with faculty representatives. Further revision designed to increase security is experimentally under way. A retirement system has been adopted providing an annuity of from one-third to one-half average annual income on payment of premium of 5 percent of the salary by the teacher, matched by similar payment of 5 percent by the university.

Educational assistants, educational and scientific supplies and equipment.—Teaching resources in these items have been trebled during the progress of the 10-year program, but the university is still operating 34.2 percent below the objectives in these fields.

Faculty publications.—Publications of the entire university faculty during the year 1939-40 were as follows: 4 books, 112 scientific and scholarly articles and 19 book reviews. In addition there were 14 other creative contributions such as poetry, paintings, etc. Practically all schools and colleges of the university were represented in these publications and contributions.

THE GRADUATE SCHOOL

Enrollment.—The graduate school is second in enrollment among the schools and colleges of the university. The number of students registered in the school for 1939-40 was 398.

Sources of students and degrees held.—The students enrolled in the graduate school this year came from 30 States, the District of Columbia, and 4 foreign countries. Sixteen Southern and Southwestern States and the District of Columbia, in which separate schools were mandatory, furnished 329 graduate students or 82 percent of the total enrollment.

The students enrolled in the graduate school received their bachelor's degree from 67 colleges and universities. Although the majority of the students in the graduate school are holders of the bachelor's degree, 24 held the master's degree prior to entering the graduate school.

Departments of instruction and faculty.—The graduate students for the year 1939-40 did their work in 19 departments of instruction. One hundred and fifty-nine, or 39.9 percent of the students in the graduate school, did their work in the departments of education, psychology, and philosophy. One hundred and eight, or 27 percent, did their work in the social sciences of economics, sociology, and social work, history, and political science. Fifty-four, or 13 percent, did their work in the natural sciences of mathematics, zoology, chemistry, physics, and bacteriology. Sixty-one, or 15 percent, did their work in English, German, and romance languages. Sixteen, or 4 percent, did their work in art, home economics, and religious education.

Sixty teachers offered courses of instruction in the graduate school during the year 1939-40.

Graduates and degrees conferred.—Forty-one master's degrees were conferred in June 1940. Nine received the degree of master of science, 31 the degree of master of arts, and 1 master of arts in social work.

Future development in graduate work.—The rapid development and accreditation of public schools and colleges for Negroes in the States of their majority residence within the last 10 years has created an acute and growing need for mature teachers with thoroughly competent training on the graduate level. The soundness of the educational structure throughout these States depends primarily upon the caliber of graduate instruction which is made available to meet this situation.

There is yet nowhere among these States a single tax-supported college of liberal arts with a sufficient number of departments of instruction and a sufficient amount of resources for personnel, educational supplies, and equipment to undergird and maintain the establishment of a first-rate graduate school.

Howard University, because of its superior personnel, facilities, and equipment, is still the most promising center for graduate work for Negroes. It is of the utmost importance to the States of the Negroes' majority residence and to the Nation that all possible steps be taken

to place and reinforce the graduate work at Howard University on a sound and thoroughly competent basis.

The continuous development of competent research and sound instruction require certain immediate steps. (1) The teaching staff must be supplemented with mature, well-paid scholars. (2) The book collection in the library must be doubled. (3) Scholarships and fellowships must be increased, so that qualified students may not be turned away without assistance. (4) Funds should be made available for faculty research projects and a university press.

THE COLLEGE OF LIBERAL ARTS

Outstanding trends and events.—The outstanding event of the year was the placing of the college on the approved list of the Association of American Universities.

One of the most significant steps which the college has taken in the direction of the improvement of instruction has been the inauguration of a college-wide advisory system, including the practice of giving mid-semester grades.

Enrollment.—The enrollment in the college of liberal arts during the first and second semesters of the year 1939-40 comprised 579 men and 625 women—a total of 1,204 students. The summer school enrollment of college students for 1939 was 218, some 98 of whom were students who were not in school during the regular term, making a combined gross enrollment—including summer school, of 1,351 students for 1939-40.

Graduates.—In June 1940 there were 115 students who graduated from the college of liberal arts.

Faculty.—For the year 1939-40 there were 92 teachers in the college, inclusive of the two Regular Army officers in the R. O. T. C. Of the total, 81 were full-time and 11 were part-time teachers. During the past year 3 members received their doctor's degrees; 6 were on leave of absence acquiring advanced training in their respective fields; 4 did part-time graduate work in 2 local universities.

MILITARY SCIENCE AND TACTICS

Enrollment.—The enrollment in the department of military science and tactics for the year 1939-40 was 370 for the first semester and 332 for the second semester.

Unit rated as "excellent".—Major Harry M. Gwynn inspected the R. O. T. C. unit from May 20 to May 22, 1940. As a result of the inspection, the unit was rated as "excellent," the highest rating authorized by regulations.

Commissions awarded.—Fifteen students were awarded commissions as second lieutenants, Officers' Reserve Corps, United States Army.

THE SCHOOL OF ENGINEERING AND ARCHITECTURE

General trends.—The Howard University school of engineering and architecture is the only school of its kind in the United States primarily for Negroes. Over one-fifth of the Negro engineers and architects in this country are graduates of this school and approximately one-half of the students now studying engineering and architecture in the United States are enrolled at Howard University.

Enrollment.—During the school year 1939-40, 62 students registered for degrees in engineering and architecture, representing an increase of 2 students over those of the previous year.

Graduates.—At the June 1940 commencement, five students received bachelor of science degrees as follows: One in architecture; three in electrical engineering, and one in mechanical engineering.

Faculty.—The faculty for the year 1939-40 consisted of eight full-time teachers during the first semester and nine during the second semester. Two members of the faculty were on leave of absence, one for the year and one for the second semester. Seven members of the faculty are registered engineers or architects by examination in the States of Alabama, Indiana, Maryland, Ohio, Pennsylvania, Virginia, and the District of Columbia.

THE SCHOOL OF MUSIC

General trends.—The school of music of Howard University offers degree courses in piano, public-school music, organ, voice, and violin, and maintains a junior department for the purpose of developing a larger group of students with sound basic training in music.

With a number of Negro schools and colleges closing their doors to music, the school of music of Howard University has a greater responsibility and obligation than ever before.

Enrollment.—There were 209 students registered in the school of music for the year 1939-40. Eighty-three of these were registered in the regular courses leading to a degree; 96 were enrolled in the junior department, and 30 were special students in the degree departments.

Faculty.—The faculty was composed of 15 teachers during the year 1939-40. Twelve were full-time and three were part-time teachers. One member of the regular staff was on sabbatical leave continuing research in the field of Creole folk music and doing graduate study at Columbia University and the Institute of Musical Art, New York; one received the degree of master of arts in music education from the University of Pennsylvania.

Graduates.—Eight graduates were awarded music degrees in June 1940. Five received the degree of bachelor of music and three received the degree of bachelor of school music.

Outstanding events of the year.—On May 17 and 18, 1940, complete performances of the grand opera Faust were given by the school of music.

The school of music presented on its annual concert series the following artists: The Russian Trio; Egon Petri, pianist; Luther King, tenor; Hugh Porter, organist; Eugenia Buxton, pianist, and Anne Brown, soprano.

The University Glee Club gave a number of concerts, including one at the White House. This was the third appearance there during the last four years. The Women's Glee Club gave five full concerts during the year and made appearances on several university and civic programs.

THE COLLEGE OF MEDICINE

Outstanding events of the year.—In addition to the new relationship between the medical school and Freedmen's Hospital and the placing of all departments of instruction under full-time leadership, referred to above, the medical school continued a program to improve the general health of the Negro population throughout the country.

(1) The postgraduate course in venereal disease control was continued with 13 Negro physicians in attendance.

(2) The second annual conference of Negro tuberculosis workers was held at Howard University on May 27–28, 1940, with 24 Negro physicians specializing in tuberculosis and 96 others attending the conference.

(3) A grant of \$1,200 was made by the National Tuberculosis Association and the American Social Hygiene Society for continuation of the study of the student health program in colleges for Negroes.

(4) Mr. Abraham H. Lichtman donated an incubator for premature infants to the college of medicine, the division of pediatrics, for use in the Freedmen's Hospital. Mr. Lichtman plans to add other such units from time to time until the hospital is adequately provided with facilities for proper care of prematurely newborn babies.

Students.—Of a total of 282 listed applicants, 237 presented the minimum requirements for admission. Of this number 40 were offered admission to the freshman class. Twenty-six of these registered. The greatest number of medical students registered at any time during the year was 122.

Graduates.—At the June commencement the degree of doctor of medicine was conferred upon 33 graduates, 32 of whom have secured internships in approved hospitals, while one plans to pursue graduate study at McGill University.

Faculty.—The faculty for the year consisted of 96 members, 32 of whom were full-time teachers and 64 were part-time. Four members

of the faculty were engaged in graduate study as General Education Board fellows.

THE COLLEGE OF DENTISTRY

General trends.—The most significant trend in the college of dentistry is the continued professional improvement of the staff. Within the last seven years eight members of the staff have completed graduate work in dentistry and are now prepared to render highly specialized services in their respective fields.

Students.—Seventy students were registered in the college of dentistry for the year 1939–40. The total enrollment of 70 is a gain of 19, or 37 percent, over the enrollment of 51 for the year 1938–39. The 24 students in the freshman class for the year 1939–40 constituted an increase of 6 over the 18 students in the entering class of the year 1938–39.

Graduates.—At the June commencement for 1940 there were seven graduates who received the degree of doctor of dental surgery and seven who received certificates in oral hygiene. Five dental graduates have been awarded internship opportunities in leading American clinics.

Faculty.—The faculty for the year 1939–40 consisted of 15 members, 12 of whom were full-time and three were part-time. One member of the regular staff was on leave of absence, doing postgraduate work in the department of oral surgery of the Columbia University School of Dental and Oral Surgery.

THE COLLEGE OF PHARMACY

General trends.—As reported in June 1939 the college still is unable to meet the demands made upon it for graduates or individuals seeking employment in retail pharmacy. The requests come from all sections of the country and offer attractive opportunities. There is no unemployment problem for our graduates.

Accreditation.—In January 1940 the American Council on Pharmaceutical Education published its first list of accredited colleges of pharmacy which included the college of pharmacy of Howard University.

Enrollment.—There were 38 students registered during the year 1939–40 as compared to 31 for the year 1938–39.

Graduates.—In June 1940 five students were awarded the degree of bachelor of science in pharmacy as compared with one in June 1939.

Faculty.—The faculty for the year included one full-time professor in pharmacognosy, one full-time associate professor in pharmacy, two full-time instructors in pharmacy, and one part-time instructor in pharmacy.

Supplies to various departments.—The college purchases, manufactures, and provides at cost all the medicinal preparations used by the University Health Service. The college supplied during the year 1939-40, 2,286 labeled packages ready for dispensing as compared with 1,944 packages in 1938-39, an increase of 342 packages or 17 percent. This represents a saving of approximately \$735 to Howard students. The faculty in 1939-40 filled 260 prescriptions for students, as compared with 192 prescriptions for the year 1937-38.

THE SCHOOL OF LAW

The role of the school of law.—Howard continues to be the only accredited law school south of the Mason-Dixon line which freely admits Negro students and is the only accredited law school in the United States which attempts to offer an adequate, general legal education and at the same time to emphasize and give special consideration to the problems of particular concern to the Negro. Moreover, the facilities of the school for research and the counsel and guidance of the faculty are more than ever in demand for the advancement of legal causes of general importance to the Negro.

Enrollment.—Sixty-one students, 2 of them women, enrolled for the year 1939-40, of whom 19 were regular students enrolled in the entering class.

Graduates.—At the commencement in June 1940, 21 candidates received the degree of bachelor of laws. The ranking member of the graduating class of 1940 has been granted a Rosenwald Fellowship to study at Columbia Law School during 1940-41.

Faculty.—Nine persons constituted the teaching staff of the law school this year. Six rendered full-time and three part-time services. One of this year's teaching staff will study at Harvard Law School during 1940-41 as a Rosenwald fellow.

Library.—The total number of volumes now in the law library is 21,240. During the current year 670 volumes were purchased and 330 were acquired by gift. A full-time librarian with the rank of assistant professor of law was appointed to take office in September 1940.

THE SCHOOL OF RELIGION

Financial support.—The school of religion receives no aid from Government funds. Its work is maintained entirely by endowments, private gifts, and funds.

General trends.—Beginning in 1932, only college graduates have been permitted to matriculate as regular students in the school of religion. Each year since that time there has been a gradual increase in enrollment, from 5 students in 1932 to 41 in 1939-40.

Accreditation.—The American Association of Theological Schools, on December 1, 1939, placed the school of religion on its list of accredited theological schools.

Enrollment.—There were 41 students enrolled in the first semester and 43 (2 of whom were auditors) in the second semester in the year 1939-40.

The school has been interdenominational from its very beginning. Nine denominations were represented by the students during the past year.

Graduates.—Eight students were graduated from the school of religion on June 7, 1940. Four received the degree of bachelor of divinity and 4 received the master's degree in religious education.

Faculty.—The faculty for the year 1939-40 consisted of four full-time teachers and seven part-time teachers.

THE LIBRARY

Gifts.—The outstanding gifts this year were: Dr. Jesse E. Moorland, deceased Howard trustee, 2,776 books on the Y. M. C. A., Negroes, art, music, law, religion, and the social sciences, 2,531 periodicals, 8,958 pamphlets, 16,000 clippings, 27 scrapbooks, and a first edition of *The New York Conspiracy*, our most valuable book; the estate of William H. Baldwin of Washington, D. C., 66 books, 28 pamphlets, and 279 periodicals on social problems; Mrs. Amy Spingarn, 663 letters of Dr. Joel Spingarn concerning the American Conference, the Des Moines Training Camp, and the National Association for the Advancement of Colored People; the late Prof. Kelly Miller, 435 letters concerning the National Negro Library and Museum; Mrs. Walter H. Pinchback, 153 documents, addresses, letters, and circulars relating to the latter's public life; and Augusta Savage, sculptress, bust of a Negro Woman—her own work.

Statistics for the university libraries.—The total number of books, periodicals, and pamphlets in the university is now 131,431, of which 110,191 are carried on the main library accession records, while the remaining ones are in the law library uncataloged collection. During the year there were accessioned by the main library 11,481 volumes. This number includes 4,482 new books purchased, 5,996 gifts (mostly accumulated material received in previous years), and 430 books added by binding. There were classified or cataloged 7,383 titles and 14,179 items. Eight hundred and forty-three periodical titles were received by all libraries. The circulation record in all libraries was 167,529.

FINANCES

Assets.—The total assets of the university on June 30, 1940, were \$9,769,828.71. Of the total assets, the sum of \$1,102,849.30 represents assets in the physical plant extension fund, made possible through private gifts of the General Education Board and the Julius Rosenwald Fund, and through rentals of the property purchased by the gifts of these funds: \$980,913.42 represents endowment (an increase of \$1,815.21); \$7,560,410.83 represents plant fund assets (an increase of \$244,580.82 since the report of June 30, 1939); \$1,368.30 represents a small loan fund for students in the school of medicine. The remaining \$124,286.86 represents assets of the current fund.

Income and expenditures.—The total income for the year 1939-40 was \$1,377,841.54, including current and capital funds. This represents \$231,646.06 less than the total income for the year 1938-39. Gross income for current purposes was \$1,164,213.72, representing an increase of \$16,353.69 over the income for current purposes for 1938-39. Of the total income for current purposes the Government contributed \$753,297.34, or \$29,932.57 more than the Government contributed for 1938-39. The income for current purposes from private sources in 1939-40 was \$410,916.38 which was \$13,578.88 less than the income for current purposes from private sources in 1938-39.

The total expenditures for all purposes, current and capital, for the year 1939-40, were \$1,389,216.32, representing a decrease of \$227,302.27 in the total expenditures as compared with the year 1938-39. The total current expenditures for the year 1939-40 were \$1,175,588.50, representing an increase of \$20,697.48 over the current expenditures for the year 1938-39.

The audit of funds.—The auditing of all the university's accounts has been done by certified public accountants. All moneys appropriated by the Congress and the Public Works Administration were expended under the supervision of the Secretary of the Interior.

INDEX

	Page		Page
Bituminous Coal Division	451	Biological Survey, Bureau of—Continued.	
Board's part important.....	458	Cooperative control of injurious animals..	282
Coal Act constitutional.....	452	Predatory-animal control.....	282
Coal vital to national defense.....	453	Benefits of predator control.....	284
Cooperating in national defense.....	456	Cases of predation.....	283
Condition of the coal industry.....	451	For depredation control.....	282
Conditions grew worse.....	455	Rodents and communicable dis-	
Constitutionality of the act.....	464	eases.....	285
Constitutionality of regulatory provi-		Rodent control.....	285
sions.....	464	Benefits of rodent control.....	286
Delegation of legislative power as		Instances of rodent and rabbit	
to price fixing.....	464	damage.....	286
Due process.....	464	Economic research on wildlife.....	240
Power under the commerce clause..	464	Cooperative food habits research.....	243
Injunction.....	465	Laboratory research on food habits..	243
Other litigation.....	465	Investigations of wildlife research	
Pending and prospective litigation.....	468	units.....	243
Status sunshine coal as bituminous....	465	Mosquito control and wildlife habitat.	242
Validity of the 19½ percent tax provi-		Canada goose management studies.	242
sion.....	464	New food habits laboratory at Patux-	
Division took over work.....	456	ent research refuge.....	244
Industry cooperators.....	458	Aid to Federal, State, and other	
Minimum prices now in effect.....	456	agencies.....	244
Not remaking industry anew.....	453	Research in control of harmful mam-	
Prices kept below cost.....	452	mals.....	247
Proceedings for establishment of minimum		Predator studies.....	247
prices and marketing rules and regula-		Studies of injurious birds.....	245
tions.....	461	Robin and oriole damage to grapes.	245
Results cannot yet be related.....	457	Studies of nutrition and physiology of	
Sales agents governed.....	460	upland game birds.....	245
Proceedings instituted by the Com-		Crow depredation on nesting game	
mission.....	461	birds.....	246
Substitutions are provided.....	459	Duck injury to peas and grain....	246
Thirty-nine exemptions granted.....	461	Merganser damage to game fish....	246
Continuation of proceedings by the		Other bird-control activities.....	246
Division.....	462	Repellent experiments.....	247
Effective date of minimum prices and		Sandhill crane damage to grain....	246
marketing rules and regulations.....	463	Waterfowl-management investiga-	
Establishment of minimum prices and		tions.....	240
marketing rules and regulations.....	463	Ecological and management	
Examiner's report—exceptions thereto		studies.....	240
and argument before Director.....	462	Reconnaissance of refuges and	
Review by Secretary of the Interior..	463	refuge sites.....	241
Twelve thousand three hundred code		Redhead duck management	
members.....	459	studies.....	242
Waste is tremendous.....	454	Suppression of waterchestnut.....	242
		Waterfowl-nesting studies.....	240
Biological Survey, Bureau of	223	Federal aid in wildlife respiration.....	256
Acquisition of land for refuges.....	261	Biological Survey and wildlife inven-	
Administration of wildlife conservation		tories.....	256
laws.....	275	Fur-animal conservation and restoration..	248
Regulatory action.....	276	Cooperative investigations.....	249
Work of game-agents.....	276	Fur-fiber investigations.....	250
Apprehensions under various stat-		Nutritional studies.....	250
utes.....	277	Fur Animal Experiment Station,	
Under-cover operations.....	277	N. Y.....	251

	Page		Page
Biological Survey, Bureau of—Continued.		Biological Survey, Bureau of—Continued.	
Fur-animal conservation and restoration—Continued.		Research on wildlife status and management—Continued.	
Fur Animal Field Station, N. D.	252	Waterfowl situation	229
Fur production and the fur trade	248	Investigations in Alaska	230
Fur supply and annual take	248	Investigations in Canada	229
Laboratory investigations	248	Investigations in Mexico	231
Reproduction studies	249	Investigations in the United States	231
Selling Federal furs	249	Wildlife relationships to forest and range	235
Silver fox quota	248	Distribution and migration records	235
War and the fur trade	248	Wildlife management research	237
Rabbit Experiment Station, Calif.	251	Cooperative research units	237
Karakul sheep studies	251	Wildlife conservation in Alaska	287
Importation and other permits issued	279	Biological investigations	289
Permits under the Migratory Bird Treaty Act	281	Changes in regulations	287
For propagation	281	Law enforcement	288
For scientific purposes	281	Predator control	289
Mammals	281	Wildlife restocking projects	288
Regulations	279	Wildlife-disease research	252
Species entered under permit	279	Fur-animal disease control	252
Species excluded	279	Game-bird diseases	253
Birds	280	Infectious diseases in big game	253
Introduction	223	Physical properties of quail feeds studies	253
Dissemination of wildlife information	228	Range-improvement studies	255
Organization changes	225	Research on national park wildlife	254
Other events of the year	225	Wildlife relationships	254
Fur-production investigations	226	Board of Geographical Names	469
Other wildlife studies	226	Advisory Committee	469
Pest control	228	Executive Committee	470
Research on game birds	225	Geographic distribution of names	470
Wildlife restoration	227	Sources of requests for decisions	470
National wildlife refuge program	265	Bonneville Power Administration	127
Administration and management of refuges	265	Many new industries possible	128
Big game preserves and ranges	268	Marketing proceeds rapidly	129
Bird refuges	266	Prime power contracts executed as of September 14, 1940	130
Increased use by wildlife	266	New power plays defense role	127
New refuges	266	Reconstruction speeded	131
Development of refuges	269	Six hundred miles of line complete	131
Biological development	270	Substation program extensive	132
Civilian Conservation Corps development of refuges	271	Civilian Conservation Corps	401
Cooperation with the Works Projects Administration	273	Activities in national parks	403
Inspection of proposed drainage projects	273	Cooperate in wildlife conservation	406
Engineering work	269	General Land Office camps	401
Public use of refuges	274	In the territories	405
Economic uses	274	Indian C. C. C. program	402
National Youth Administration assistance	274	Non-Federal areas benefited	405
Recreational facilities	275	Range rehabilitation advanced	406
Research on wildlife status and management	229	Training important feature	404
Banding game and other birds	233	Work in reclamation	402
Additional birds banded	234	Columbia Institution for the Deaf	496
Bird-banding cooperators	233	Courses of instruction	496
Return and recovery records	234	Health	497
Biological investigations on wildlife refuges	236	Needs of the institution	497
Funds available	229	Normal department	496
Other migratory game birds	232	Presentation day	497
Work on federal refuges	233	Receipts and expenditures	498
State biological surveys and faunal studies	239	Seventy-fifth anniversary	497

	Page		Page
Director of Forests, Office of	214	Fisheries, Bureau of—Continued.	
Business management.....	217	International relations.....	293
Custodian of vast land areas and diverse forest resources.....	215	Halibut investigations.....	293
Forest protection.....	218	Japanese activities in Bering Sea.....	300
Forestry problems handled.....	216	Administration of fishery laws and regulations.....	301
National defense.....	214	Propagation and distribution of food and game fishes.....	306
Report to the Joint Congressional Committee on Forestry.....	215	Fishery Market New Service.....	311
		Propagation of commercial species.....	307
Exhibits, Office of	477	Anadromous species, Atlantic coast.....	308
The year's accomplishments.....	477	Commercial species, interior waters.....	309
Fisheries, Bureau of	291	Game species.....	309
Alaska Fisheries Service.....	301	Pacific salmon.....	307
Alaska Fur-Seal Service.....	303	Upper Mississippi wildlife and fish refuge.....	310
Foxes.....	305	Protection of seal, otters, walruses, and sea lions.....	306
Fur-seal patrol.....	306	Summary.....	292
Fur-sealskins taken by natives.....	305		
Sale of sealskins.....	305	Freedmen's Hospital	499
Seal herd.....	304	Accounting system.....	501
Teak of sealskins.....	304	Activities and achievements for the fiscal year 1939-40.....	500
Products of the fisheries.....	303	Lowered mortality rate.....	500
General activities.....	303	Filing system.....	502
Appropriations.....	329	Growth exceeds physical capacity and personnel.....	502
Protection of fish runs from engineering developments.....	329	Howard University relationship.....	500
Biological fishery investigations.....	317	Professional advancement.....	499
Agricultural investigations.....	326	Training school for nurses.....	500
Great Lakes fishery investigations.....	324		
Long Island cooperative investigation.....	320	General Land Office	134
Middle and South Atlantic fishery investigations.....	319	Alaska.....	154
North Pacific and Alaska fishery investigations.....	321	Alaskan Fire Control Service.....	143
Pacific pilchard investigations.....	323	Protection of forests on public lands in Alaska.....	143
Shellfish investigations.....	325	Program.....	144
Shrimp investigations.....	320	Aviation leases.....	154
Sponge investigations.....	326	Carey Act.....	153
Water quality investigations.....	328	Cadastral engineering service.....	139
Construction activities.....	299	Accepted surveys and resurveys.....	139
Cooperation with Federal, State, and other agencies.....	298	Conservation of forest resources on the Oregon and California revested lands in Oregon.....	144
Division of Fishery Industries.....	311	Conservation program.....	144
Economic and marketing investigations.....	316	Fire hazard reduction.....	145
North Atlantic fishery investigations.....	317	Fire suppression.....	145
Statistical investigations.....	312	Miscellaneous.....	145
Canned fishery products and by-products.....	314	Reforestation.....	145
Cold-storage holdings of fish.....	314	Safety program.....	145
Landings at certain important United States ports.....	313	Telephone lines.....	145
Sectional surveys.....	313	Tree and plant disease control.....	145
Shad and Alewife fisheries.....	313	Truck trail construction.....	144
Technological investigations.....	314	Control of coal fires in Wyoming.....	145
Manufacture of fishery byproducts.....	315	Maps, plats and diagrams.....	139
Nutritive value of aquatic products.....	315	Photolithographic copies, etc.....	139
Preservation of fishery products for food.....	315	Filing of plats of survey.....	157
Sponge market, Tarpon Springs, Fla.....	314	Civilian Conservation Corps.....	144
International Pacific Salmon Fisheries Commission.....	295	Color of title.....	154
		Contests, other than mineral contests.....	157
		Desert-land entries.....	152
		Exchanges.....	155
		Exchanges with States.....	154

	Page		Page
General Land Office—Continued.		General Land Office—Continued.	
Federal reclamation projects.....	152	Township diagrams.....	158
Forestry on the revested and reconveyed		Tract book notations.....	158
lands in western Oregon.....	140	Withdrawals and restorations.....	158
Corrective legislation.....	140	Final entries, or entries based on final	
Forest policy.....	140	certificates issued during the fiscal	
Progress in organization.....	141	year ended June 30, 1940.....	160
Resources.....	140	Lands patented with mineral reserva-	
Results of operations.....	142	tions.....	161
Grazing leases.....	155	Summary of mineral lands with-	
Homestead entries.....	157	drawals and classifications out-	
Indian lands and claims.....	155	standing on June 30, 1940.....	161
Land classification.....	146	Leases other than mineral, outstand-	
Classification reports.....	146	ing on June 30, 1940.....	160
Federal land inventories.....	147	Mineral leases, permits, and leases out-	
Land classification in Alaska.....	147	standing June 30, 1940, by classes...	159
Mineral reservations in outstanding		Original entries and selections made	
patents.....	147	during the fiscal year ended June	
Need for better records.....	148	30, 1940.....	160
Objectives.....	146	Patents issued and certifications	
Organization and problems.....	147	having the effect of patents made	
Planning a public domain.....	147	during the fiscal year ended June 30,	
Research and analysis.....	147	1940.....	161
Town site project.....	148	Geological Survey.....	39
Leases other than aviation, grazing, and		Alaska Branch.....	50
mineral.....	156	Field work.....	51
Mineral leases and mining claims.....	151	Office work.....	52
Coal, potash, phosphate, sodium, and		Reports and maps.....	53
sulphur permits, leases, and licenses.	151	Appendix.....	78
Mineral applications and entries.....	152	Appropriations and expenditures.....	74
Mineral contests.....	152	Conservation Branch.....	66
Oil and gas leases and permits.....	151	Mineral Classification Division.....	67
Miscellaneous.....	156	Water and Power Division.....	67
National forest homestead lands.....	157	Mining and Oil and Gas Leasing Divi-	
Pittman Acts.....	153	sions.....	68
Private land claims.....	156	Public land.....	69
Public lands.....	138	Public works projects.....	70
Areas under lease.....	138	Indian land.....	70
Pending entries.....	138	Naval petroleum reserves.....	70
Surveyed and unsurveyed public		Summary of field activities, by States.	71
lands.....	138	Geologic Branch.....	41
Vacant and unreserved public lands;		General studies.....	41
grazing districts.....	138	Work of the year, by States.....	44
Withdrawn and reserved areas.....	138	Library.....	74
Public sale and timber and stone applica-		Topographic Branch.....	53
tions.....	157	Field surveys.....	55
Railroad grants and selections.....	154	General office work.....	53
Range Development Service.....	142	Cartography.....	54
Allocation of funds.....	142	Computing.....	53
Appropriation.....	142	Inspection and Editing.....	54
Range improvements.....	143	Photomapping.....	53
Range program.....	143	Map Information Office.....	55
Receipts and expenditures.....	148	Work of the year, by States.....	55
Distribution of receipts.....	149	Water Resources Branch.....	58
General.....	148	Ground Water, Division of.....	61
Receipts under mineral leasing acts.....	148	Surplus Water, Division of.....	60
Receipts under the Taylor Grazing		Federal bureaus.....	59
Act.....	149	Permittees and Licensees of the Federal	
Repayments.....	150	Power Commission.....	59
Rights-of-way.....	152	States.....	59
State grants and selections.....	153	Power Resources, Division of.....	65
Status sheets.....	158	Quality of Water, Division of.....	63
Supplemental patents.....	158	Water Utilization, Division of.....	64
Swamp and overflowed lands.....	153	Work of the year, by States.....	61
Timber.....	156		
Town plots and town sites.....	156		

	Page		Page
Geological Survey—Continued.		Howard University—Continued.	
Work on publications.....	72	General trend of the university.....	503
Distribution.....	73	College of liberal arts takes important steps to improve quality of instructions.....	505
Engraving and printing.....	73	Division of social sciences sponsors public lectures.....	505
Geologic map editing and drafting.....	73	Four additional divisions of the university accredited.....	504
Illustrations.....	73	Increased number and caliber of students.....	504
Texts.....	72	Medical school continues to go forward.....	506
Grazing Service.....	330	Outstanding needs of the university..	507
Civilian Conservation Corps.....	351	Physical-plant improvements.....	504
Accomplishments.....	352	Postgraduate courses established in dentistry.....	505
Range management, range development and related projects.....	353	Progress of the special Negro library collection.....	505
Soil protective and range productive projects.....	353	School of law gives decisive help in important civil rights cases.....	506
Communication.....	352	School of religion makes significant advances.....	506
Safety and education.....	351	Successful civilian pilot training program.....	505
Training.....	351	Status and progress under ten-year plan.....	503
Cooperation.....	339	Student body and resources.....	503
Cooperation with Office of Indian Affairs.....	341	Graduate school.....	511
Cooperation with Bureau of Biological Survey.....	341	Library.....	518
Cooperation with the Bureau of Reclamation.....	340	Gifts.....	518
Cooperation with the National Park Service.....	341	Statistics for the university libraries..	518
Cooperation with the Southern Pacific Land Co.....	340	Military science and tactics.....	513
Growth of the Grazing Service.....	332	Commissions awarded.....	513
Land classification.....	338	Enrollment.....	513
Lands.....	336	Unit rated as "excellent".....	513
Establishment of grazing districts.....	337	School of engineering and architecture.....	514
Miscellaneous grazing district modifications.....	337	School of law.....	517
Status of grazing districts—approximate acreage, 1940.....	338	Library.....	517
Operations.....	335	School of music.....	514
Organization.....	334	School of religion.....	517
Pierce Act leases.....	338	Students.....	507
Range improvements.....	349	Geographical distribution.....	508
Maintenance.....	350	University enrollment.....	507
Range improvements by licensees.....	350	Students of graduate caliber.....	508
Records.....	350		
Range management.....	341	Indian Affairs, Office of.....	354
Advisory boards.....	348	Arts and crafts.....	394
Appeals and hearings.....	347	Alaska.....	397
Enforcement.....	347	Teachers help in census taking.....	398
Fire protection.....	344	Councils of field administrators.....	394
Range surveys.....	342	Effort toward better personnel.....	392
Carrying capacity surveys.....	343	Government does not pension tribes.....	378
Dependent property surveys.....	342	Indians receive credit.....	375
Range studies.....	343	Expansion of Indian beef cattle industry.....	375
Squaw Butte Range and Livestock Station.....	344	Indian irrigation.....	377
Utilization studies.....	343	Irrigated lands and Indian self-support.....	378
Wildlife.....	346	Lands restocked for production.....	374
Howard University.....	503	Livestock associations.....	376
College of dentistry.....	516	Indian employment.....	389
College of liberal arts.....	515	Indian health.....	379
College of medicine.....	515	Death rate is declining.....	384
College of pharmacy.....	516	Health through education.....	380
Finances.....	519	Navajo use own funds for dentistry...	381
Assets.....	519		
Audit of funds.....	519		
Income and expenditures.....	519		

	Page		Page
Indian Affairs, Office of—Continued.		National Park Service—Continued.	
Indian health—Continued.		Civilian Conservation Corps cooperation	
Research in trachoma and other dis-		in park work.....	201
eases.....	382	Coronado Cuarto Centennial cooperation.....	185
Indian population.....	362	Emergency Relief Act projects.....	202
Land.....	366	Expansion of the Federal Park System.....	185
Allotments hamper land use.....	369	Changes in existing Federal park	
Indian Civilian Conservation Corps		areas.....	186
protects forests and ranges.....	373	Further additions to existing Federal	
Land losses cease.....	367	park areas.....	187
Livestock reduced to save land.....	370	Acadia National Park, Maine.....	187
Timber resources conserved.....	372	Atlanta campaign markers.....	187
Tribes buy back their lands.....	368	Badlands National Monument.....	187
Schools and the use of Indian resources.....	384	Blue Ridge Parkway.....	187
Changed requirements for teachers.....	385	Boulder Dam National Recrea-	
Day schools are community centers.....	388	tional Area.....	187
Beginners learn conservation.....	387	Capitol Reef National Monu-	
Summer schools for in-service training.....	385	ment.....	187
Textbooks in two languages.....	386	Chaco Canyon National Monu-	
Tribal self-government.....	363	ment.....	187
Two decades in review.....	357	Chalmette National Historical	
Information, Division of.....	474	Park.....	187
Photographic Section.....	475	Fredericksburg and Spotsylvania	
Publications Section.....	476	County Battlefields Memorial	
Radio Section.....	475	National Military Park, Va.....	187
Investigations, Division of.....	435	Glacier National Park.....	187
Cooperation with other agencies.....	436	Grand Canyon National Park.....	187
Summary.....	440	Great Sand Dunes, Colo.....	187
Expenditures.....	440	Great Smoky Mountains Na-	
Letter of transmittal.....	v	tional Park.....	187
Mines, Bureau of.....	1	Guilford Courthouse National	
Finances.....	35	Military Park, N. C.....	187
Future work.....	5	Jefferson National Expansion Me-	
Review of the year's work.....	7	morial project.....	187
Technologic Branch.....	7	Kennesaw Mountain National	
Coal Division.....	7	Battlefield Site.....	187
Mining Division.....	10	Mammoth Cave National Park,	
Metallurgical Division.....	12	Ky.....	187
Petroleum and Natural Gas Divi-		Natchez Trace Parkway.....	187
sion.....	15	Petersburg National Military	
Nonmetal Division.....	18	Park, Va.....	188
Explosives Division.....	21	Petrified Forest National Monu-	
Coal Economics Division.....	23	ment, Ariz.....	188
Economics and Statistics Branch.....	23	Rocky Mountain National Park.....	188
Petroleum Economics Division.....	24	Shenandoah National Park.....	188
Mineral Production and Eco-		Vicksburg National Military	
nomics Division.....	25	Park, Miss.....	188
Metal Economics Division.....	27	White Sands National Monu-	
Nonmetal Economics Division.....	28	ment.....	188
Foreign Minerals Division.....	29	Yellowstone National Park.....	188
Health Division.....	30	Yosemite National Park.....	188
Health and Safety Branch.....	30	National monuments established and	
Safety Division.....	32	other areas transferred to Service..	186
Information Division.....	34	National parks established.....	186
Administrative Branch.....	34	New designations.....	186
Office Administration Division.....	35	Proposed additions to Federal Park	
Museum, Department.....	479	System.....	190
National Park Service.....	162	Adirondack National Recreational	
Accommodations furnished by park		Area, N. Y.....	190
operators.....	196	Coronado International Monu-	
		ment, Ariz.....	190
		Escalante, southeastern Utah.....	191
		Manuelito, N. Mex.....	191
		Oregon Coast National Park,	
		Oreg.....	190

Page		Page
	National Park Service—Continued.	
	Expansion of the Federal Park System—Continued.	
	Proposed additions to Federal Park System—Continued.	
	Rehoboth-Assateague National Seashore, Delaware, Maryland, Virginia.....	190
	Saint John Island National Recreational Area, Virgin Islands..	191
	Ship Island, Miss.....	191
	Tensas Swamp National Park, La.....	190
	Proposed extensions to existing Federal park areas.....	188
	Kings Mountain National Military Park, S. C.....	188
	Rocky Mountain National Park, Colo.....	188
	Status of Federal park areas authorized by Congress.....	188
	Andrew Johnson Homestead National Monument project, Tennessee.....	189
	Big Bend National Park project, Texas.....	188
	Cape Hatteras National Seashore Recreational Area project, North Carolina.....	189
	Cumberland Gap National Historical Park project, Tennessee, Kentucky, Virginia.....	188
	Everglades National Park project, Florida.....	189
	Monocacy Military Park project, Maryland.....	189
	Patrick Henry National Monument project, Virginia.....	189
	Richmond National Battlefield Park project, Virginia.....	189
	Saratoga National Historical Park project, New York.....	189
	Forest protection and fire prevention.....	191
	C. C. C. assistance in forest protection.....	192
	Campground protection.....	193
	Detection system.....	192
	Fire equipment.....	192
	Fire record.....	191
	Fire-protection training.....	192
	Forest nurseries and planting.....	194
	Insect control.....	192
	Protection planning.....	192
	Type mapping.....	194
	White pine blister rust.....	193
	Historic American buildings survey.....	174
	Historic and archeologic sites survey.....	174
	Information Service.....	183
	New printing procedure for park literature.....	183
	Encyclopedias and almanacs.....	185
	Lectures.....	184
	Radio.....	184
	Interpretive service and scientific research.....	176
	Conservation in park development....	178
	Fish conservation.....	182
	Museums.....	178
	National Park Service—Continued.	
	Interpretive service and scientific research—Continued.	
	Naturalist training.....	176
	Progress in research.....	177
	Reduction of grazing by domestic stock.....	181
	Wildlife management.....	180
	Wildlife studies.....	179
	Memorials.....	175
	Jefferson National Expansion Memorial, St. Louis, Mo.....	175
	Mount Rushmore National Memorial, S. Dak.....	175
	Thomas Jefferson Memorial, Washington, D. C.....	175
	National Capital parks.....	198
	Parkway development.....	196
	Planning and construction.....	194
	Engineering laboratory.....	195
	Field radio systems.....	195
	Recreational demonstration areas.....	202
	Sanitation and safety precautions.....	199
	State relationships.....	171
	The park, parkway, and recreational area study.....	170
	The year's high lights.....	163
	Use and development of historic areas.....	171
	Regionalization increasingly effective.....	168
	United States Travel Bureau approved by Congress.....	169
	Petroleum Conservation Division.....	219
	Cost of administration.....	221
	Examinations outside the east Texas area.....	221
	Operations in the east Texas area.....	219
	Summary of east Texas refinery operation, 1940 fiscal year.....	221
	Special investigations and litigation.....	221
	Puerto Rico Reconstruction Administration..	421
	Cooperatives.....	426
	Cooperatives with which the cooperative Division of the P. R. R. A. is working.....	429
	Lafayette Sugar Cooperative.....	426
	Los Canos Sugar Cooperative.....	427
	Other cooperatives.....	429
	Vanilla cooperative.....	428
	Vegetable cooperatives.....	427
	Coordinated activities with other Federal and insular agencies.....	425
	Federal experiment station (U. S. Department of Agriculture).....	426
	Insular agricultural extension service (University of Puerto Rico).....	425
	Insular department of agriculture and commerce.....	425
	Engineering.....	432
	Forestry.....	431
	Other forest activities.....	431
	Parceleros.....	431
	Housing management.....	430
	Rural electrification.....	433
	Rural rehabilitation.....	422
	Land utilization.....	422

	Page		Page
Puerto Rico Reconstruction Administration—		Reclamation, Bureau of—Continued.	
Continued.		Reclamation fund—Continued.	
Rural rehabilitation—Continued.		Repayments.....	97
Livestock and poultry.....	422	Status of reclamation fund.....	97
Loans to needy farmers.....	423	Relief extended to water users.....	104
Tick eradication.....	423	Repayment legislation.....	103
Rural sanitation and health.....	423	Secondary and general investigations.....	110
Social Service.....	430	Stabilization of the Great Plains.....	83
Soil conservation.....	424	Additional projects authorized for construction.....	85
The future.....	434	Columbia Basin joint investigation.....	86
Reclamation, Bureau of.....	82	Policies regarding opening of lands for settlement.....	86
Civilian Conservation Corps.....	114	Transmission lines.....	87
Construction program.....	88	St. Elizabeths Hospital.....	481
Boulder Canyon project.....	92	Administrative Department—Office of the	
Central Valley project.....	91	Assistant to the Superintendent.....	487
Colorado-Big Thompson project.....	93	Medical Department.....	482
Grand Coulee Dam.....	90	Movement of population.....	481
Marshall Ford Dam.....	93	Movement of patient population, fiscal	
Other construction.....	94	year 1940.....	482
Crop results.....	104	Needs of the hospital.....	492
Irrigation and crop results on Federal		New legislation.....	491
reclamation projects, 1939.....	106-109	Publications.....	493
Cumulative constructive results.....	95	Solicitor, Office of the.....	441
Land opened to homestead entry.....	102	Territories and Island Possessions, Division	
Operation and maintenance.....	102	of.....	408
Organization.....	116	Antarctic Service Expedition.....	409
All-American Canal.....	124	Puerto Rico.....	413
Boulder Canyon project.....	123	Territory of Alaska.....	409
Boulder Dam, power plant, and		The Alaska Railroad.....	411
appurtenant works.....	123	The Alaska Road Commission.....	411
Irrigated acreage and areas in cultivation		Territory of Hawaii.....	412
and cumulative crop values, by		The Philippine Islands.....	418
years, 1906-39.....	117	National Assembly of the Philippines.....	420
Population of the projects.....	100	Virgin Islands.....	415
Settlement and economic data, fiscal		The Virgin Islands Co.....	416
year 1940.....	101	War Minerals Relief Commission.....	471
Power.....	95	Review of work.....	471
Reclamation fund.....	96	Acts of February 13, 1929.....	472
Accounts receivable, construction		Act of May 18, 1936.....	472
water-right charges.....	98	Act of June 30, 1936.....	472
Accounts receivable, operation and		Summary.....	473
maintenance charges (after public			
notice).....	99		
Accounts receivable, rentals of irrigation			
water.....	100		
Accretions to reclamation fund, by			
States.....	96		

